

PC NETWORK EDITION MAGAZINE



FIRST LOOKS

The IBM ThinkPad 701C's Amazing Expanding Keyboard

COMMUNICATIONS

How Fast Can They Go? 16 V.34 Modems And 15 Communications Packages Put to The Test

MODEM KILLERS

We Review 3 New ISDN Adapters

MAKING

WINDOWS

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PC Labs Tests 35 Great Windows Utilities





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THE STATION IN CHUGWATER, WYOMING

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THINGS HAVEN'T
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Of course we're not going to say Chugwater would have turned into a cultural wasteland if it weren't for *The Thistle & Shamrock* show. We're just saying that the more clearly you get your point across, the more likely it'll be heard. (Something to think about next time you're looking for a raise.)

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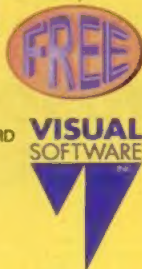
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Inside

The latest delay of Microsoft Windows 95, currently scheduled for release in August, has many users thinking about what they can do now to improve the Windows they already have on their machines. Even once the new version of Win-

dows is shipped, many people will undoubtedly wait before switching over whole organizations.

So what can you do to make Windows 3.1 easier and more powerful? The answer is: a lot. For our cover story, "Why Wait? Get More from Windows Now!", associate editor Thomas Mace and project leader Jay Munro

utilities today. Some utilities offer features that go beyond Windows 95, offering things such as multiple virtual desktops. Mace and Munro worked with several of our most knowledgeable contributors (such as Sheryl Canter and Barry Simon), wading through dozens of utilities to find the ones that offer the most advantages for

today's Windows users.

Staying connected is another big concern for many of us, and that means modems and communications software. The new V.34 modems, capable of communicating at speeds of up to 28.8 Kbps, offer faster, better connections. See our story "V.34 off the Starting Block" for a



The apps development team: Not waiting for Windows 95.

looked at literally dozens of Windows utilities with all sorts of capabilities. Program launchers can replace or supplement Program Manager, making it easier to get to your applications. Alternative file managers give you new ways of working with the files on your disk, and file viewers let you preview documents without launching applications.

Features like these are slated to be part of Windows 95, but they are available in Windows

look at the first of this new generation of modems. Of course, you'll need communications software to take advantage of these modems, so you'll also want to check out the best general-purpose comm programs in "Do You Still Need Comm Software?"

And for those who really want to connect to a new world, virtual-reality software offers some unique ways. See our comparison of VR products, "Virtually Here."—*Michael J. Miller*

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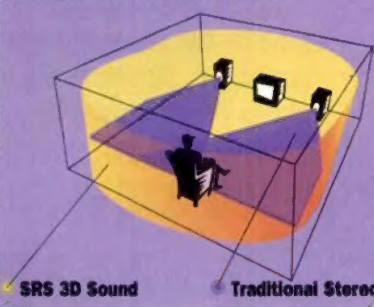
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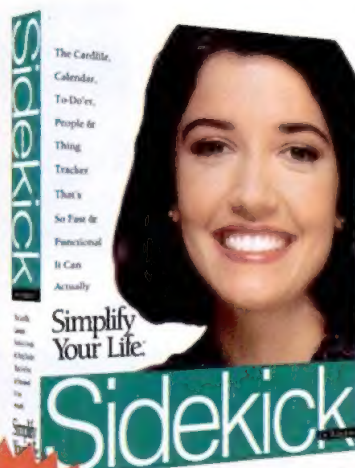
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*Quote excerpted from a review of the Vivid 3D Plus in the December 20, 1994 issue of *PC Magazine*. Quote excerpted from a review of the SRS technology in the April 1992 issue of *Audio Magazine*. Electronic Gaming Monthly quote excerpted from May 1994 issue. **This specially recorded CD recreates the experience of 3D sound from any CD player. The demo CD is available for a \$5.95 shipping and handling charge which can be fully credited toward the purchase of a Vivid 3D system. This offer applies only to Vivid 3D products purchased directly from NuReality. International orders do not include freight charges, duty or VAT. The Vivid 3D sound enhancement system won the Retail Vision "Best Product" award in May 1994, and the Innovations award from the International Consumer Electronics Show (CES) in June 1994. The Vivid 3D Pro won the Innovations award from CES in January 1995. **srs(●)** is a registered trademark of SRS Labs. All product names are trademarks or registered trademarks of their respective holders. © 1995 NuReality. All rights reserved. PCMag1

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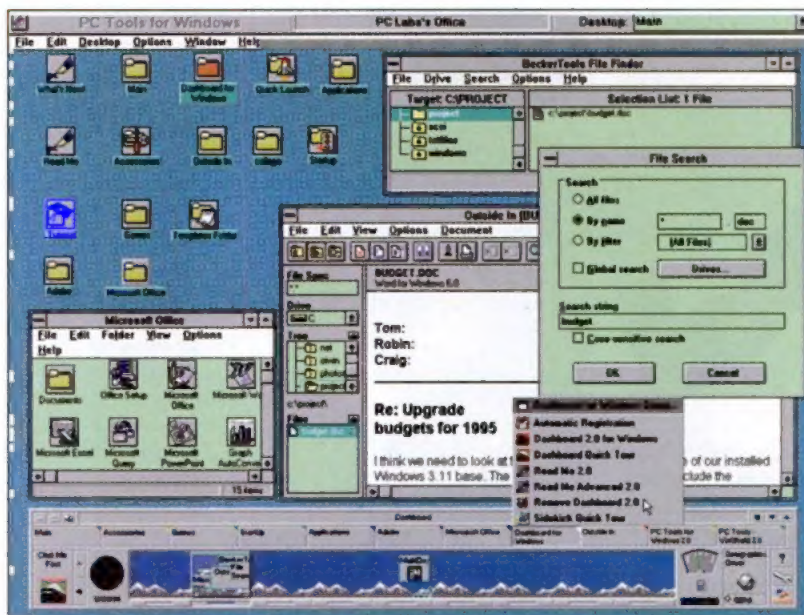
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Windows Utilities



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Get More from Windows Now!

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BY LINDA AND ERICK VON SCHWEBER Our virtual-reality overview illustrates the tantalizing fact that VR is here, on the PC, now. Because VR is such a rapidly developing area, we put it in focus for you by defining the types of VR and discussing some of the ways businesses are using VR applications. We also diagram a typical VR setup and take a look at the software development tools and hardware components that you need.....168



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Do You Still Need Comm Software?

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V.34: Off the Starting Blocks

BY EARLE ROBINSON The moment the V.34 standard was ratified, several vendors managed to get modems out the door quickly. V.34 modems promise faster speeds and generally improved performance. With their more powerful processors and better firmware, you can expect them to perform more reliably at lower speeds, too. Our expanded tests of 16 new V.34 modems show how quickly and reliably each modem connects with the modem at the other end or with other brands.....241



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Why not add zip to those old modem calls and free up your calling options? These three products give you the speed of ISDN and still keep you connected to the analog world.

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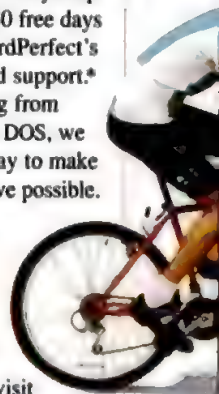
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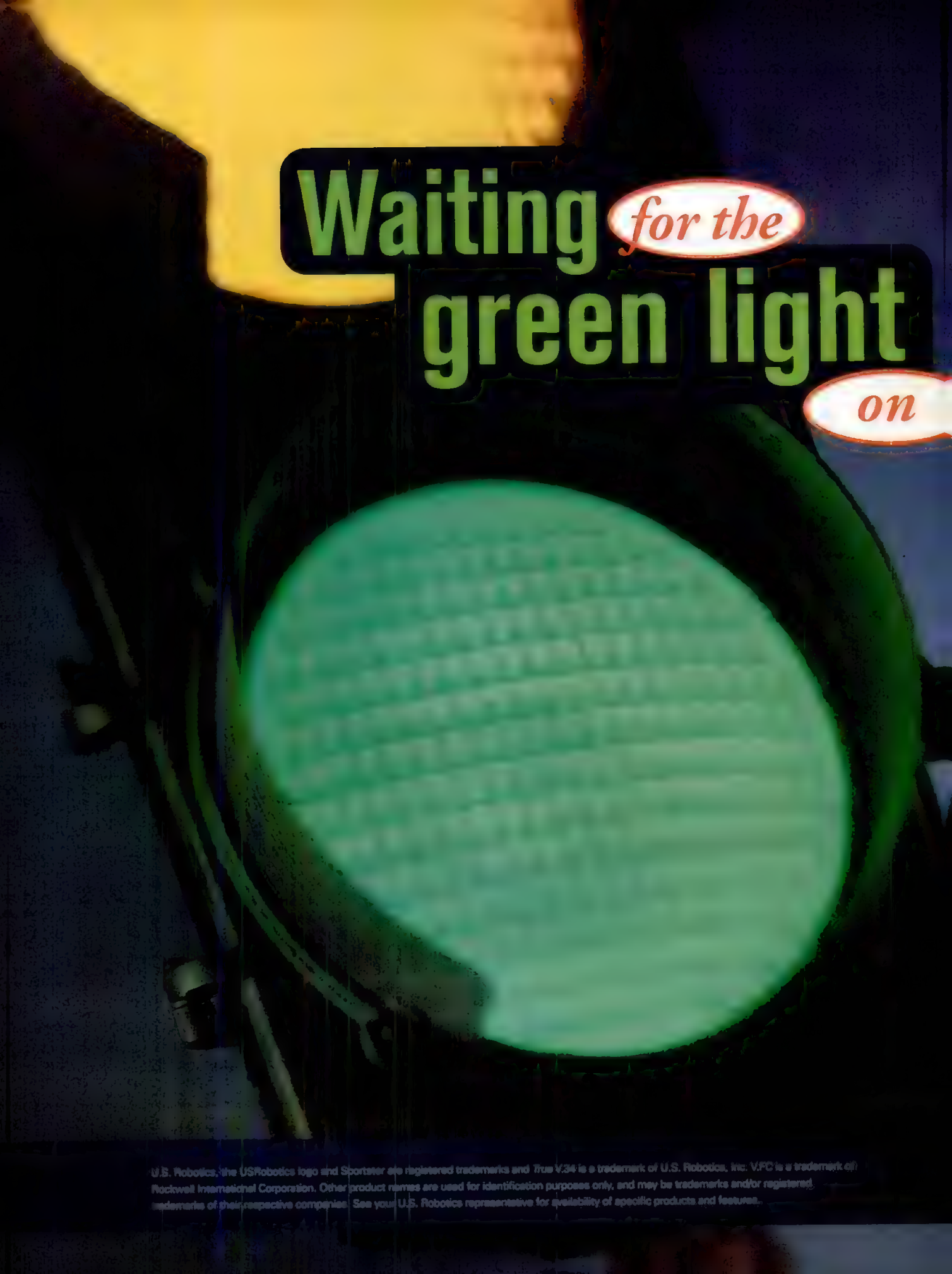
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"(MGA Ultima Plus) is one of the fastest cards we have seen."

PC Magazine,

Best of 94 Jan. 10, 1995, p. 142



"It's the MGA Impression Plus' combination of sophistication and down-to-earth street price that wins it our MVP Award this year."
PC Computing, Dec. 1994, p. 140

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Letters

TRIALS AND TRIBULATIONS

We had an overwhelming response to Robin Raskin's Pipeline column, "Free Trials that I Can't Afford" (November 22, 1994). Most of our readers emphatically agreed with Raskin's perspective, having at some time found themselves in a similar situation with the on-line services. Other readers, though, emphasized the need to take responsibility for one's actions. And still others simply saw this as a ploy by the on-line services to increase their revenues.

What a pleasure it was to read Raskin's column. Bravo for denouncing the abuse being dished out by on-line services; it's a problem that's been ignored for far too long. I've had problems with both GENIE and America Online (AOL) charging my credit card account without authorization. With AOL, it took me five months to get them to stop charging me, and longer to receive a refund.

Rodney Recor
Albany, Ohio

I was able to quit both Prodigy and AOL easily, without having to resort to canceling my credit cards, changing my identity, or sneaking out of town under the cover of night. Yes, I kept track of my on-line time, just as I would keep an eye on the odometer of a rental car with limited free mileage or how much the food I'm ordering in a restaurant is adding up to.

Philip J. McCole
via PC MagNet

Technology isn't the issue behind the lack of an on-line notification. The point is, on-line services don't want you to quit their service. If a product is difficult to cancel, many customers just won't bother, and the services retain yet another subscriber.

James McQuivey
via the Internet

Coming off my first month of 10 free hours, I must disagree with Raskin's premise. The bottom line is, the user must be responsible for his or her own actions. It seems to me that any prudent individual



*Bravo for denouncing
the abuse being dished out
by on-line services.*

would keep a log of their on-line time; I certainly did. And the service I used made it very easy to log and track my remaining free time.

Terry Smith
via the Internet

Raskin's column on the so-called "free" on-line trials was greatly needed. I admit that I was suckered into trying the on-line services, and the only one that charged me after I canceled was CompuServe. Thanks for the warning—and the reminder that nothing in life is free.

Ashima Saigal
Alto, Michigan

Having been inundated with my share of free trial offers, I couldn't agree with Raskin more. After all, it would be a simple task for the on-line services' computers to alert us when our free time has expired. I think many more people, including myself, would like to try these services, but not while you have to give your credit card number.

Gordon P. Ireland
via the Internet

My experience echoes the concerns in Raskin's column. Uncomfortable with the

idea of giving AOL a credit card number, I used a card I planned on canceling. AOL ended up billing me even after I canceled the account both on-line and by phone. The credit card I had closed kept sending me bills. I repeatedly called AOL and finally got them to credit my closed credit card account for three of the five months I had been contesting. I was grateful to get that much.

Dan Isbell
via PC MagNet

As a CompuServe member for over ten years, I found Raskin's column to be grossly unfair. It's extremely easy to check on your time spent on-line and cancel your account on-line.

Mack Davis
via the Internet

I signed on for 10 free hours with Delphi, and spent a total of 30 minutes on-line. Yet they billed me for that so-called "free" time, and without my knowledge signed me up for a full membership. Over the next three months Delphi billed my credit card even though I told them to cancel my account. I was able to get Delphi to credit my charge card for only two of the three times.

David Lee
via the Internet

Aside from AOL's making it nearly impossible for you to cancel your membership, I discovered that they really don't close your account. I had an AOL account, and then I canceled it. When I later decided to give them another try and signed up using AOL's software, I was told that my credit card number was already on file.

Neal Jacob
via the Internet

Raskin's statement degrading those who keep on-line logs was offensive. I consider myself quite sane; during November, I was on-line 1,065 minutes. Anyone who's responsible will keep an on-line log.

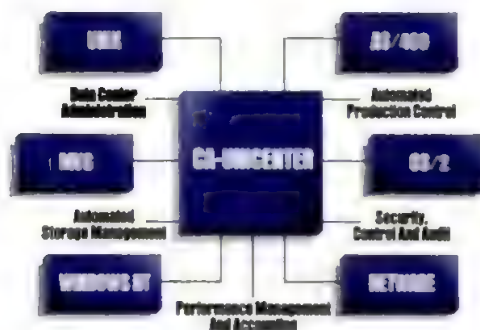
James E. Teague
via the Internet

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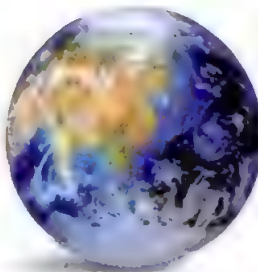


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LETTERS

TO UPGRADE OR NOT TO UPGRADE

The article "New Life for Your Old PC?" (November 8, 1994) was informative but daunting. I'm now having second thoughts about upgrading. Where's the point in paying \$250 to get only a 20 percent performance increase? The fact that there was no Editors' Choice also speaks for itself. Chip manufacturers will simply have to do better than sell lame processors at high prices.

*Sven Vandermespel
via PC MagNet*

Although I was glad to see that you did not give an Editors' Choice award for any of the CPU-upgrade products reviewed, I was disappointed that you didn't give motherboard replacements their fair shake in "Motherboard Swap: Yes or No?," a sidebar to your upgrade story. The price/performance advantage of this upgrade far outshines either CPU or system replacement. I think you underestimate the mechanical abilities of your screwdriver-wielding readership.

*Robert L. Wright
via the Internet*

Upgrading can be a cost-effective option, especially for the buyer who is doing it to accomplish particular tasks, as opposed to upgrading just for the sake of being at the forefront of technology.

*Alan Hare
via PC MagNet*

The article on CPU upgrades was extremely informative. It provided me with the insight I needed to make the decision to upgrade my CPU. I chose Cyrix, received excellent technical support, and am extremely satisfied with the performance enhancement.

*James A. Bryant
Kissimmee, Florida*

Backed by Kingston Technology's four years of experience in processor upgrades, I take exception to your blanket conclusion that buying a new system is more advantageous than upgrading. You cite that the upgraded system will still lag

behind with ineffective video, hard disk, and memory performance, yet 80 percent of our customers have already upgraded either some or all of these components. For users who are attempting to stretch the life of their computer while conserving their budgets, processor upgrades provide the last piece of the puzzle needed to power today's demanding software.

*Darin Ferriola
Processor Upgrade Product Manager
Kingston Technologies
Fountain Valley, California*

Your CPU upgrade article was well-written and researched. However, I think you missed the "bus" when you chose not to review the performance of 386SX CPU replacements. No 386 needs more of a boost than the SX.

*William Cernansky
via the Internet*

With every new issue of *PC Magazine*, I learn about faster PCs, smaller PCs, better PCs, and all the new technology that goes along with them. But with your recommendation to buy a new machine, as opposed to upgrading, I have to wonder what is happening to all those outdated 286 and 386 machines that are replaced. As a teacher, I know the value of having computers in the classroom; when it comes to learning basic computer skills, it doesn't matter if you're using a 286 or a Pentium.

*Joe Anthony
San Diego, California*

• **There are several organizations that accept donations of older computers. After being refurbished, the computers are placed in schools and nonprofit organizations, as well as with individuals. These organizations include The Computers for Schools Program (800-939-6000) in La Jolla, California; the Computer Recycling Center (415-428-3700) in Mountain View, California; The East-West Foundation (617-542-1234) in Boston; and The National Christina Foundation in New York (800-274-7846).—Ed.**

IN THE HERE AND NOW

John C. Dvorak has hit the bull's-eye with his commentary in "Windows NT Is in Your Future" (November 22, 1994).

Windows 95's shortcomings have made me realize that it will not be the 32-bit operating system that I'm looking for. Besides, why should I worry about Windows 95 when I can have a really solid operating system right now in Windows NT 3.5?

*K.J. King
via the Internet*

The similarities between Microsoft's software offerings and our nation's current administration are striking. Both are eternally floating trial balloons promising all things to all people. And both Bills are always promising that the next great step is right around the corner.

*Stanley Wood
via the Internet*

Dvorak claims that Microsoft is "stalling" the introduction of Windows 95. But this makes little sense; everyone knows that software development is fraught with difficulties and bugs; the more complex the software, the more problems will arise. It makes perfect sense that Windows 95 is late, even if it's frustrating for developers or those of us who want to buy it. If John thinks good architecture is terrifying, I hope he never tours Europe.

*Steve Collins
via the Internet*

CORRECTIONS AND AMPLIFICATIONS

The correct address for *PC Magazine* on the World-Wide Web is <http://www.pcmag.ziff.com/~pcmag> ("Inside," February 21, 1995).

HOW TO WRITE TO PC MAGAZINE

We welcome your comments and suggestions. Please send correspondence to Letters, *PC Magazine*, One Park Ave., New York, NY 10016-5802. You can send e-mail via the Internet at 157.9301@mcimail.com, or you can upload it to PC MagNet (see page 12 for access information). You can also send e-mail to individual editors. Type GO PCMSTAFF on ZiffNet for a list of addresses. All letters become the property of *PC Magazine* and are subject to editing.



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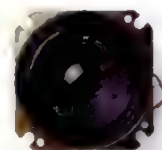
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1. U.S. 50%
Foreign 50%

1993

1. U.S. 50%
Foreign 50%

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4. France
5. Germany
6. Canada
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The Bottom Line

This is not the case. Just keep the big picture in mind. You do need your portfolio in the first place in order to take advantage of different opportunities which present themselves in the market.

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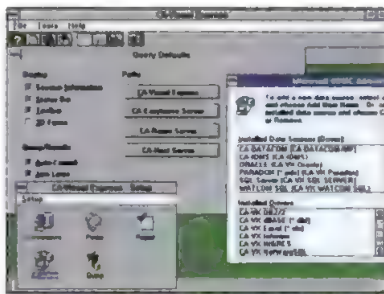
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Trends

TRENDS & TECHNOLOGY SHAPING THE PERSONAL COMPUTER MARKET

Macintosh Clones: Too Little, Too Late?

Apple moves to increase mind share and market share.

After a decade of selling proprietary technology, Apple Computer has decided to make Macintosh clones a reality by licensing its technology and operating system to independent hardware developers. This major shift in business strategy is designed to pump

up the market share of Macintosh and compatible computers from 10 percent to 20 percent by 1996, while at the same time helping Apple reinvent itself as a software company.

FUEL FOR SOFTWARE DEVELOPMENT

Apple's objective is to establish a healthy Macintosh clone market, much as Microsoft did for the PC market in the early 1980s by licensing DOS to clone vendors and as IBM did by making the PC an open standard. The hope at Apple's headquarters in Cupertino is that this will create a critical mass of customers that software developers need to see before they'll develop Macintosh software. However, the lightning pace of technology in the past decade has vastly changed the landscape of the computer industry.

First up with Mac clones are Power Computing, a Silicon Valley startup partly owned by Olivetti and led by one-time PC clone designer Stephen S. Kahng, and Radius—which dominates the Macintosh peripherals market. Both have announced plans to ship Macintosh clones early in the second quarter. The systems will have PowerPC chips, making them competitive not only with Apple's own machines, but also with PCs and workstations.

The critical question is whether Apple's new business strategy can drive up earnings. Apple, an \$8 billion company, won't say what it's charging clone makers to license its operating system and firmware, but one thing's for sure: Apple can sell a Macintosh



for a lot more than it can license one Mac operating system. As a ballpark reference, Microsoft is currently charging about \$35 for companies to license DOS and Windows 3.1.

TECHNOLOGY FREE-FOR-ALL

How will Macintosh clones differentiate themselves? The basic formula will stay the same, and several components are likely to remain Apple-only, such as the operating system and ROM BIOS. Other items are likely to be a free-for-all, with vendors offering alternative motherboards, hard disk drives, video adapters, and other components. Radius, ATI, and Diamond are developing graphics boards for Mac clones.

Power Computing has said that it will sell complete systems directly to customers, as well as system boards to other companies interested in producing Macintosh clones. If components for Macintosh clones come from various suppliers, Mac users could see the system's lauded hardware compatibility threatened. However, plug-and-play hard-

ware compatibility on the PC side hasn't even arrived yet.

If Apple hopes to license its Mac OS in volume, it's going to have to attract some bigger system vendors. The key is the PReP specification. Convergence between IBM's Power PC Reference Platform (PReP) specification and Apple's Mac OS, which would allow IBM to license the Mac OS and run it on its PowerPC systems, has been problematic. Will Macintosh clone vendors struggle with Apple just as IBM has? Dee Cravens, director of marketing for Radius, says no: "We have 100 percent access to Apple's motherboard design and OS, and we've got proven synergy working with Apple."

TOP AND BOTTOM MARKET

Some clone vendors are planning to charge rock-bottom prices, like the ones that ignited the success of PC clone powerhouses such as Leading Edge, where Stephen Kahng was a designer in the 1980s. Kahng's Power Computing expects to sell many of its mail-order Mac clones for under \$1,000. Other clones will come in at the high end. Radius' entry into the Mac clone market will be a \$30,000 video-editing workstation that will compete with Silicon Graphics systems costing three times as much.

The PC community doesn't seem much concerned with Macintosh clones. While PowerPC chips are capable of running Windows applications in emulation (at a performance disadvantage compared with running Windows applications on a PC), the attractiveness of compatibility with Mac apps has dwindled, as virtually all Mac apps now have Windows twins.

Apple's decision to create a clone market may or may not be successful, but it didn't really have a choice. At the recent MacWorld conference, one of the most popular technical seminars was given by Microsoft. It covered how Macintosh programmers can learn to write Windows applications. —Sebastian Rupley and Carol Levin

Pipeline By Robin Raskin

The Trouble with Bob

By now you've probably met Microsoft Bob. Bob is a monolithic (30MB) home application that's best characterized as a family information manager. Everything about Bob—the applets, the templates, the content, the user interface—is the result of three intense years of research into social and human interfaces. While Bob is a noble undertaking that packs some walloping technology, it draws a fine line between user friendliness and condescension.

The trouble with Bob is that you're expected to have fun as you compute. You're expected to have the time to saunter into personally decorated rooms, where you enter lists and lists of everything, from your appointments to your aspirations. Each family member decorates roomfuls of objects that serve as gateways to Bob applications.



Then there's a series of guides to take you through the program. Rover, a panting, scratching, sniffing little dog is the default, but you can choose less intrusive, more intrusive, and even more abusive characters. Believe it or not, Microsoft created full psychological profiles for each of these characters. You can shut these guides off, but while they're on, you've got to interact with them. This usually involves clicking on "please" and "thank you."

More problematic still is that Bob is a lifestyle. It includes a checkbook manager, a letter writer, an address maker, a scheduler, built-in e-mail, a trivia game, and a slew of household management tools. Although you can shell out to other applications, you can't selectively install just the applications you'll use. It's a total immersion kind of thing.

The best part of the program is the wonderfully integrated letter writer, address book, and calendar. Some of Microsoft's top technologies (Wizards, OLE, and so on) surface here to turn ter-

rifying concepts such as mail-merge into child's play. Other applets—such as the household manager, which includes templates for gifts (given and received), medical records, auto repairs, favorite books and restaurants, valuable possessions, travel plans, and so on—are more uneven. Essentially, these are databases of information, some better designed than others. By the time you've drilled down to the application itself, knocked on the door, clicked on some furniture, and then waded through some icons... it's not quick going.

Even the name Bob was born of research. (See Bill Machrone's column in this issue.) The idea here is that Bob is a buddy, a friend, one of the family—who evokes friendly feelings about your computer. (There was a groundswell movement at Microsoft to call the program "Bill," but it's rumored that certain Bills have veto power.) I keep slipping and calling it HAL, probably because I think that's where Microsoft is heading with this one.

Bob is a demanding program. It wants to be the environment where you run all your applications. It wants to conduct meaningful dialogs with you. It wants to get involved with every part of your life. And because it has big ideas, Bob is a big commitment. I used to jot down my list of valuables in a word processing file and my kids immunizations in Excel. Bob has given me a complete and oh-so-anthropomorphic world in which to do those things.

I'm used to being rude to my computer, and I'm used to my computer being rude to me in return. We have a quick-and-dirty relationship, and the computer never asks me for my nickname or tries to get me to say thank you for letting me exit a program. In trying to personalize the experience, Bob may have forgotten that I'm a person who'd prefer to limit my personal commitments to nonmachines. It's not that I think the "social interface" (Microsoft's term for this new, nonintimidating environment) is bad; I just think Bob has the social interface skills of a Saturday morning cartoon. And for all Microsoft's research effort, I'm afraid that even my most computer-naïve friends think Bob would ultimately be too "cute" to use for any length of time.

Robin Raskin is the editor of PC Magazine.

Law and Disorder On the Internet

AMERICAN LAW HASN'T BLAZED many trails in the wilds of cyberspace, but three recent events illustrate how current laws are being interpreted to apply to on-line activities.

● *Freedom of speech.* Many Internet regulars approve of the removal of mass advertising (known as "spam") on Usenet newsgroups to prevent Usenet from becoming a free billboard service. Internet defenders have forged "cancel" messages from the writer of the original post which seek out and remove messages. Such a tool, however, can also be used to censor others' writings. Readers of the alt.religion.scientology newsgroup have complained in recent months of

a score of forged cancellations of messages critical of the faith. Meanwhile, lawyers for the Church of Scientology have demanded that the newsgroup be shut down for copyright infringement and violation of the Trade Secrets Act after excerpts of Scientology documents appeared on-line.

● *Wire fraud.* A federal judge in Massachusetts recently narrowed the grounds on which software pirates may be prosecuted. David LaMacchia, an MIT student, was accused of committing wire fraud by running a BBS from which users downloaded over \$1 million in copyrighted software. The judge threw out the indictment, stating that while LaMacchia did something improper, it wasn't wire fraud. And since LaMacchia didn't make a profit on the downloaded software, the court declared that he didn't infringe on the Copyright Act.

● *Patents.* The recent Unisys-CompuServe fracas over Unisys' LZW compression soft-

ware emphasized the diligence with which technology companies must monitor the Net. When Unisys and CompuServe agreed to a royalty scheme for use of Unisys' compression technology in the popular .GIF file format (which is widely used on the Internet), the Internet was swamped with angry users concerned that Unisys was trying to hobble development of Internet front-ends or trying to claim revenue from a technology that wasn't rightfully its own.

After a barrage of furious accusations from Internet users, Unisys and CompuServe clarified the royalty scheme. The agreement doesn't affect end users, freeware developers, or shareware registered before the agreement took effect in late January 1995. Software authors on the CompuServe plan will make out quarterly checks to CIS for at least 15 cents per registered copy of the software—a financial burden, and also one of paperwork and ill will.—*Angela Gunn*

Rolling Out Mobile Data Networks

TODAY, WITH A NOTEBOOK, A CELLULAR modem, and a cellular phone, you can send wireless e-mail and faxes, but the analog cellular network is really designed to carry voice rather than data. On the horizon are several digital standards for wireless messaging that promise improved reliability, increased throughput, and lower costs.

Cellular Digital Packet Data (CDPD), developed by IBM and Pacific Communications Sciences, squeezes a digital sig-

nal into the open channels of the existing analog cellular system. If a channel is needed for voice, the protocol jumps to another open channel without interrupting service. Several cellular service providers are installing equipment in cell sites around the country to accommodate CDPD (see map). Providers include AirTouch, Ameritech, Bell Atlantic Mobile, BellSouth, GTE, McCaw Cellular, NYNEX mobile, and Sprint Cellular. But the performance of CDPD in the crowded radio frequency spectrum is unclear. And CDPD is better suited for short, "bursty" messaging—such as credit-card verification—than for lengthy downloads or for applications that require a live interactive connection, such as video conferencing.

CDPD Kick Starts Wireless E-Mail

HAILED EARLY ON AS THE TECHNOLOGY that could remotely monitor the inventory of vending machines, cellular digital packet data—the transmission of wireless messages over existing cellular networks—now promises more than just fully stocked Coke machines.

As the U.S. is being un-wired for CDPD service, developers are inventing applications that reach a broader market: the mobile professionals who want wireless e-mail and wireless Internet access. To help kick start the CDPD market, the first CDPD developers' conference was held last fall, and Bell Atlantic Mobile, a CDPD provider for several New England and Mid-Atlantic states, has opened a lab—a "CDPD greenhouse"—where independent developers can test applications.

The customized CDPD applications up and running today handle short, "bursty" data at up to 19.2 Kbps: Airline ticket agents with PDAs can book passengers, retailers can verify credit cards, police in the field can check license plates, and brokers can get instant stock prices. The next wave of applications targets broader markets such as wireless Lotus Notes messaging and scheduling.

CDPD may also untether Internet users, since the standard incorporates TCP/IP, the

protocol understood by all computers on the Internet. "CDPD could be characterized as 'Internet Anywhere' if you're prepared to pay the bill," says Andrew Harries of Vancouver-based Sierra Wireless, which sells a CDPD modem. To help reduce the cost, the Seattle-based software firm WRQ has developed algorithms that send fewer

CDPD Deployment



Cellular service providers expect to offer commercial CDPD service early this year in at least 16 cities. Field trials are up and running in several cities.

Source: CDPD Forum

packets over the network, optimizing TCP for wireless data transmission over CDPD.

The success of CDPD depends on the commitment of the cellular carriers to full deployment and the performance of CDPD under heavy traffic, according to The Yankee Group, a Boston-based research firm. And it'll take another two years to resolve the technical and logistical issues involved with nationwide roaming. Bell Atlantic Mobile is now doing interoperability tests with Ameritech and GTE to enable nationwide roaming. —Carol Levin

Beyond the Beep: Popular Mobile Apps

Travelers use of mobile apps ranges from faxing to accessing information services, reports a Yankee Group survey of IS managers. Mobile data networks are being developed to handle the traffic.

	Mobile users
Sending/receiving faxes	77%
Checking voice mail	54%
Accessing company database	52%
Getting paged or beeped	50%
Joint project sharing	39%
Sending/receiving e-mail	36%
Accessing information services	25%

Source: The Yankee Group

Cellular carriers expect to solve these problems by deploying all-digital networks. The two leading standards for future digital cellular networks in the U.S. are Time Division Multiple Access (TDMA) and Code Division Multiple Access (CDMA). (The digital system in Europe is called GSM.) TDMA is currently easier to deploy, but it's limited to short messaging.

CDMA offers many more opportunities than TDMA. The CDMA Forum, an industry group with more than 60 participating companies, recently proposed a plan to integrate data throughput of up to 64 Kbps over the existing cellular system. CDMA will also incorporate CDPD for short messaging, giving today's CDPD software developers an upgrade path (see accompanying story).

A newcomer to public data messaging is rolling out a different kind of network that uses low-cost, solar-powered cell sites mounted on utility poles. Metricom's Ricochet is a campus-wide wireless network that connects buildings in university and business park settings using the same unlicensed radio spectrum used by garage door openers, portable phones, and wireless LANs, which significantly reduces the cost of the service. Based on spread spectrum technology, the Ricochet network sends signals through open channels, jumping to find open channels fast enough so that the signals don't interfere with other services using the same frequencies. Metricom says that its latest version of Ricochet offers throughput as fast as 100 kilobits per second—almost four times as fast as a 28.8 Kbps modem.

Test networks are running in Cupertino, California, and Redmond, Washington, and service recently began in Dearborn, Michigan. Metricom plans full service in San Francisco and Seattle next.

—Nathaniel Zelnick

Paging Dick Tracy's Watch

SEVERAL WIRELESS TECHNOLOGIES are still in the formative stages, but there's one that's going through the roof: Paging. There are close to 20 million pagers in use in the U.S. and analysts estimate that this number will double by 1998. If so, pager-based communications will closely track the growth in use of the other hugely popular wireless communication technology: cellular. Their low cost, low power consumption, and reliable in-building messaging (better than cellular) are keys to the growth in pager usage. Improved designs, applications, and protocols are also poised to help the technology move beyond those clumsy belt-looped black boxes and into the future.

How about the closest thing to Dick Tracy's watch yet? Seiko, in partnership with Motorola, already flopped once with a way-too-bulky attempt at a pager/watch hybrid, but it's new \$79.95 MessageWatch is sleek and multifunctional. Onboard the chip set—called the Advanced Communications and Timekeeping Technology (ACTT)—is a miniature FM radio data receiver that can receive all kinds of information, from the Dow Jones and prime rate closings to weather forecasts. Data is transmitted as subcarrier signals by FM radio stations Seiko has around the world. (Reception for the radio signals is local only.) Standard paging services cost \$8.95 a month and other information delivery services start at \$2.95 a month. According to Mike Park, vice president of business and network development for Seiko Communications, the marriage of paging and radio technologies helps make the watch “a more diverse device which can deliver information as customized as localized traffic incident reports.”

Notebook pagers are also new to the market. NovaLink Technologies NovaPak combines a modem and a pager (with an LCD display) in a Type II PCMCIA card. Shortly, many more of these PCMCIA pagers will have LCD panels so they can double as standard pagers.

Of course, there are significant limitations to paging technology, and if they're not improved on quickly, pagers could go the way of Betamax videotapes. Most paging systems

transfer data slowly (around 2400 bps), and limit message size to between 240 and 1,000 characters. Sending a message from a computer to a pager is often a Sisyphean task requiring customized software, a modem, and half-baked protocols. PC-to-pager software is also fairly clunky. For example, some packages are teletype-like and won't let you backspace to correct a misspelling.

Software packages such as Ex Machina's Notify or Fourth Wave Technologies' WinBeep dial into paging systems using TAP (Telelocator Alphanumeric Protocol). The catch: TAP currently supports only 7-bit ASCII text messages. The Telelocator Data Protocol (TDP) is in development and will support longer messages and digitized voice messages. Motorola is also working on a paging protocol that will support binary data file transfers at 6,400-bits per second data transmission speeds, and several companies are working on two-way paging.—Sebastian Rupley



Seiko's Message Watch doubles as a pager.



The NovaPak PCMCIA card combines a pager and a modem.

Top Retail Software

Current ranking	Last issue	Product/company
1	—	PerfectOffice 3.0 Upgrade Novell Inc.
2	8	QEMM 7.5 Quarterdeck Office Systems
3	7	Uninstaller 2.0 MicroHelp
4	3	Procomm Plus for Windows 2.0 DataStorm Technologies Inc.
5	—	WinCheckIt 2.0 Touchstone Software
6	4	MS-DOS 6.22 Upgrade Microsoft Corp.
7	—	pcAnywhere 2.0 for Windows Symantec Corp.
8	2	WordPerfect 6.1 for Windows Upgrade Novell Inc.
9	1	IBM OS/2 Warp 3.0 IBM Corp.
10	—	More PC Tools Peter Norton Group, Symantec Corp.

This list ranks PC business programs according to the total number of copies shipped to over 12,000 stores and resellers in the week ending December 31, 1994; the list can be interpreted as a picture of the entire software market. Sales information adapted from a compilation by Ingram Micro.

Briefs

THE DAYS WHEN A HANDFUL OF ON-LINE

service vendors dominated the scene are fading fast, and steep connect-time fees are fading with them. CompuServe—historically one of the most expensive services—has dropped its fees for hourly connection in half, from \$9.60 to \$4.80. Likewise, Apple has dropped its fees for hourly connection to its eworld service from \$4.95 to \$2.95. Other services are expected to follow suit. Competition is behind the new pricing structures, and not all of it's here yet. Every copy of Microsoft's upcoming Windows 95 operating system will include a copy of Microsoft Network, the company's consumer-focused on-line service. Fees for hourly connection to Microsoft Network are expected to be set around \$4.00.

AFTER ALMOST EIGHT YEARS, AMD AND

Intel have ended their costly seven-year legal battle over rights to the microcode—or internal chip software—neces-

sary for 386 and 486 microprocessors. AMD will have a license to the microcode for the quickly aging chips, but it has to pay Intel \$58 million for violating Intel's patent. Intel has to pay AMD \$18 million for breach of contract. The settlement is good for the companies and consumers alike, as the stakes in the legal battle—along with the legal fees—threatened the financial health of both companies. AMD ran the risk of losing all profits on \$2 billion in sales of the chips. And antitrust violations that AMD charged Intel with could have cost Intel \$2 billion. AMD estimates that it has spent \$100 million on legal fees since 1987, and Intel's costs are estimated to be close to that amount.

HOME PC SALES ARE NECK AND NECK WITH

TV sales, says the Electronic Industries Association. Home PC sales during 1994 reached \$8.07 billion, while TV set sales were \$8.4 billion.—Sebastian Rupley

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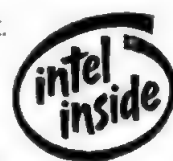
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First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

■ Portable PCs

IBM ThinkPad 701C: The Future Of Notebook Computing Unfolds

BY BRIAN NADEL

Every once in a while, a computer comes along that breaks so many established rules that it redefines the genre. The IBM ThinkPad 701C, with its expanding keyboard, 4-pound system weight, and large color display, is such a PC. When closed, the ThinkPad 701C is roughly the size and weight of most subnotebooks, but when it's opened, it transforms into a full-featured notebook with a full-size keyboard.

If you want the most full-featured computer in the smallest package but don't want to make the annoying compromises that other subnotebooks require, look no further. The \$5,000 ThinkPad 701C has successfully taken the

sub out of subnotebook.

The big news is IBM's innovative TrackWrite keyboard. The TrackWrite keyboard is not a single unit but is actually composed of two pieces that fit together to form a full keyboard.



NOW YOU SEE IT, NOW YOU DON'T: The ThinkPad 701C's keyboard comes apart and is stowed as two pieces when the lid is shut (top). When the lid is opened, it fits together like a jigsaw puzzle (right).



When the case is closed, the keyboard occupies the notebook's entire footprint, but the key's rows are offset. When the lid is raised, a spiral cam in the left hinge starts the mechanical magic by moving a series of levers and arms that slide the left half of the keyboard over to the left and the right half down and to the right, like two pieces of a jigsaw puzzle forming a whole.

The result is an 11.5-inch-long keyboard that hangs over the system's edges by about 7/8 of an inch on each side. The TrackWrite not only works well and is responsive, but it is a pleasure to watch open and close.

DESIGNED FOR ABUSE

While the feel of the keyboard is similar to that of conventional

notebooks, it does flex a little when the Enter or Tab keys are pounded. The unit is strong enough, though, so that you can safely lift the system by its keyboard wings, and IBM engineers have used a robot arm to open

departure for the ThinkPad 700 series.

Happily, the ThinkPad 701C uses an internal modem. The 14.4-kbps modem uses a digital signal processor that does double duty as a Sound Blaster-compatible sound system. The ThinkPad 701C has a built-in microphone (mounted in the right hinge) and a speaker (mounted on the bottom of the system), making it multimedia-ready.

The ThinkPad 701C includes all of the expected high-end notebook features, as well as some extras. The system can accommodate either a pair of Type II or a single Type III PCM-CIA card, and includes a combination parallel port and external floppy disk drive port that is accessible through the special connector cables that are the stock and trade of subnotebooks.

Unfortunately, the parallel port and external floppy disk rely on the same connector, so they can't be used at the same time. This is not a problem when using the included port replicator, which has a serial port connector, a video-out connector, and audio jacks. When used, the port replicator can place the keyboard at a comfortable tilt. The ThinkPad 701C has an IRDA-compliant infrared transceiver in the back for wireless file transfers or printing.

SMALL PACKAGE, BIG PUNCH

As small as the ThinkPad 701C is, it packs quite a punch. The

Continues on page 38

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ThinkPad 701C

CONTINUED FROM PAGE 37

system we tested was equipped with a 486 DX2/50 CPU, a 540MB hard disk drive, and 8MB of RAM. It was slightly off the pace set by the DX4-based units in our most recent notebook feature story (see "Power to Go," January 24, 1995). The ThinkPad 701C's Winstone 95 score of 41 was good, but this technological masterpiece really deserves to have a more powerful processor than the DX2/50 or DX4/75 units that are currently available.

The ThinkPad 701C lasted 1 hour 41 minutes on our WinDrain test (which gauges battery life under continuous use with the notebook's power-management features turned off).

In actual use, we found that the ThinkPad 701C was able to go for approximately 3 hours between charges with its power-conservation feature on the most economical setting; the nickel cadmium battery can be recharged in less than 2 hours. The system has an easy-to-read icon that includes both a numerical estimate of the amount of time remaining before the power runs out and a bar graph.

The final piece of the ThinkPad puzzle is its excellent mix of software, which starts with IBM's PC DOS 6.2 and Microsoft Windows 3.11. As a reflection of the system's executive emphasis, the ThinkPad 701C comes bundled with a software package that includes OAG FlightDisk (for on-line trip scheduling), Taxi (for navigating your way through an unfamiliar city), Lotus Organizer (for getting a handle on your business life), and half a dozen other useful applications.

As well-thought-out as this notebook is, however, the ThinkPad 701C does have some room for improvement. First of all, the 486DX2/50 model comes with a barebones 4MB of system memory, which is clearly not

BENCHMARK TESTS: IBM THINKPAD 701C

Despite its small size and its use of a 486DX2/50 processor, the IBM ThinkPad 701C was just behind the average of the 68 notebooks tested for our January 24 issue on most benchmark test suites.

We used PC Magazine Labs' Winstone 95 (Version 1.0), WinBench 95 (Version 1.0), PC Bench (Version 9.0), and WinDrain (Version 1.0) to gauge the performance and battery life of these notebooks. Each notebook had 8MB of system memory.

Higher scores represent better performance.	Winstone 95 (score)	Graphics WinMark 95 (millions of pixels per second)	Disk WinMark 95 (score)	DOSMark (score)	CPUmark 95 (score)	DOS Video (score)	DOS Disk (score)	WinDrain (hours: minutes)
IBM ThinkPad 701C	41	3.0	141	303	42	3,047	260	1:41
Average notebook (1/24/95)	40	3.5	253	405	86	2,983	338	1:58

enough for even the most miserly Windows user; the DX4/75 model comes with a much more realistic 8MB of RAM. In addition, the power switch, floppy disk drive connector, and audio plugs are inconveniently located under the TrackWrite keyboard's overhang on the left

side, making them rather difficult to get to.

These few minor missteps aside, the engineers at IBM have gracefully packed so much potential into such a small package that the ThinkPad 701C sets the new notebook standard for others to match.

► **ThinkPad 701C.** Estimated street price: *With 486DX2/50 CPU, 540MB hard disk drive, 10.4-inch active-matrix color display, \$5,000.* IBM Personal Computer Co., Somers, NY; 800-772-2227, 914-766-1900; fax, 800-426-4329.

Circle 544 on reader service card

Portable PCs

NEC Versa P/75: High Resolution Takes to the Road

BY BRIAN NADEL

As the high-resolution NEC Versa P/75 HC proves, bigger isn't always better. While most of the world's notebook makers have concentrated on integrating wide-screen 10-inch displays into their products, NEC takes a different approach by giving its \$6,099 Versa P/75 the first active-matrix color display that supports 800-by-600 pixel resolution.

Naturally, the focus of the Versa P/75 is its extra-sharp thin-film transistor screen, which NEC calls VersaVision. Because the panel contains 56 percent more pixels (480,000 versus 307,200) compared with a standard 640-by-480 resolution, display regions of an image that appeared fuzzy or oddly shaped on a standard screen will look sharper and much more realistic.

This screen comes in handy when viewing a complicated CAD drawing, a large spreadsheet, or a photographic image, and it will be indispensable for those who need to use their

portable PCs in order to produce or edit a complicated graphical image. When it comes to displaying images, nothing comes close to the VersaVision screen's ability to render curved lines and areas of subtle shading accurately.

SMALL PIXELS, SMALL FONTS

Unfortunately, for general business uses such as writing or working through a spreadsheet, fonts appear much smaller than they do on a conventional dis-



PORTABLE DESKTOP DISPLAY: The Versa P/75 is capable of showing 800 by 600 pixels on its active-matrix color screen.

play of equal size. The 9.5-inch-wide VersaVision screen is the functional equivalent of operating in 800-by-600 mode on a 12-inch monitor. So, expect to spend some time squinting at the Versa P/75.

In addition, the color depth of the screen is limited to 256 colors. NEC also makes a conventional 640-by-480 panel that can display 65,000 colors and is sold in comparable systems for \$400 less. NEC will soon introduce a panel that can display 24-bit color.

Apart from the move up to a 75-MHz Pentium processor, the basic Versa unit is very much unchanged. It is a marvel of modularity, with easy-to-change processor, hard disk, and screen. The system includes a Type III PCMCIA slot that could be used for two Type II cards, and the Versa's floppy disk drive bay can accommodate an extra battery or an additional complement of PCMCIA slots. NEC is also working on a video module for this bay.

Equipped with a 16-bit sound card, the Versa P/75 is a capable multimedia machine. The notebook includes a built-in speaker and microphone and a variety of software for producing and playing multimedia. All

First Looks

■ Citizen Puts a Color Printer in Your Briefcase

No bigger and not much heavier than a fold-up umbrella, the Citizen PN60 color printer lets those who spend a lot of time on the road print letters, prepare high-quality color overhead slides, and more. Priced at \$399, the PN60 expands your printing prowess away from the office. This printer is not for everyone, however, because of the high cost of its consumables and its slowness.

At less than a third the size of the Hewlett-Packard Deskjet 310 ink jet printer and weighing one-quarter as much, the PN60 is the smallest and lightest color printer available today. The base unit weighs 1 pound, the nickel cadmium battery adds 8 ounces, and the AC adapter adds an additional 10 ounces. The entire package can easily fit into just about any mobile executive's travel kit.

Capable of resolution of 360 dots per inch, Citizen's new thermal transfer print technology can work with paper or with overhead transparencies. With the monochrome ribbon and ordinary duplication paper, the PN60 can produce excellent looking letters, memos, and spec sheets with solid, well-formed fonts and only occasional print dropout.



COLORFUL COMPANION: The Citizen PN60 lets you produce vibrant color prints anywhere.

COLOR CONNECTION

Simply replace the monochrome ribbon with the four-color cartridge, and the printer can produce impressive color prints. In color mode, the PN60 works best with coated stock paper or transparencies; the smoother the paper's finish, the better the result.

On the downside, a single complicated color print can take up to a half-hour to complete and can take the better part of a \$7 ribbon. The \$4.50 monochrome ribbons last much longer. The major technical shortcoming of this tiny printer is that the output has a stripe roughly every eighth of an inch that is the result of overlapping ribbon passes. This gridiron pattern is most prominent when printing in color; text-only output is not affected.

Small, light, and capable of excellent print quality considering its size, the Citizen PN60 lets you take color wherever you want to go.—BN

► **Citizen PN60.** List price: \$399; 2-pack of monochrome ribbons, \$8.99; color ribbons, \$13.99. Requires: PC or Macintosh computer with parallel port. Citizen America Corp., Santa Monica, CA; 800-477-4683, 310-453-0614; fax, 310-453-2814.

Circle 545 on reader service card

told, this notebook can easily handle the audio as well as the visuals in your multimedia presentation. We still recommend that you use an external set of powered speakers for your presentations.

CACHING IN

The Versa P/75's performance did not disappoint. Equipped with a 75-MHz Pentium CPU, 8MB of system memory, a 540MB hard disk, and the added bonus of 256K of external cache, the Versa P/75 outperformed the Toshiba T4900CT on every benchmark test by a narrow margin. (For a review of the Toshiba T4900CT, see First Looks, December 6, 1994.)

While the Toshiba Pentium notebook used the same 75-MHz Pentium CPU, it was based on high-performance extended data out (EDO) memory chips and had no external cache. The Versa P/75's Winstone 95 score of 67 was 25 percent higher than the average score of our recent notebook roundup ("Power to Go,"

January 24, 1995), which represents a good cross section of the units available.

Battery rundown times were slightly shorter than the Toshiba T4900CT's 1 hour 59 minute battery life on our continuous-use WinDrain test, where the power-management feature is disabled. In view of the fact that the screen draws more power, however, the Versa P/75's 1 hour 43 minute battery life should be an acceptable compromise. With NEC's versatile power-conservation system turned on, the Versa P/75's nickel hydride battery pack could last for approx-

imately 2 hours 30 minutes of actual stop-and-go computing between charges.

Despite its well-engineered case and uncluttered internal layout, the Versa P/75 has a few design shortcomings. The front-mounted trackball seems oddly out of place in an era of pointing sticks, large trackballs, and touch pads. In addition, the price you pay for modularity is increased size and weight. At a travel weight of nearly 8 pounds 8 ounces, the NEC notebook is heavier than Toshiba's T4900CT or IBM's ThinkPad 755C, which has a 10.4-inch screen.

Much of this weight problem can be attributed to the Versa P/75's AC adapter, however, which weighs 1 pound 5 ounces including power cords.

If your work requires highly detailed images, the Versa P/75 can help brighten things up significantly with its high-resolution screen.

► **Versa P/75 HC.** Estimated street price: With Pentium/75, 8MB RAM, 256K external cache, 540MB hard disk, 9.5-inch active matrix color display, \$6,099. NEC Technologies Inc., Boxborough, MA. 800-632-8377, 508-264-8000.

Circle 546 on reader service card.



BENCHMARK TESTS: NEC VERSA P/75

The NEC Versa P/75 outscored the Toshiba T4900CT—the only other 75-MHz Pentium notebook we have tested—on all measures except one. The NEC's WinDrain battery life was 16 minutes short of the Toshiba's.

We used PC Magazine Labs' Winstone 95 (Version 1.0), WinBench 95 (Version 1.0), PC Bench (Version 9.0), and WinDrain (Version 1.0) to gauge the performance and battery life of these notebooks. Each notebook had 8MB of system memory.

Higher scores represent better performance.

	Winstone 95 (score)	Graphics WinMark 95 (millions of pixels per second)	Disk WinMark III (score)	DOSMark (score)	CPUMark 99 (score)	DOS Video (score)	DOS Disk (score)	WinDrain (hours: minutes)
NEC Versa P/75	67	9.6	422	787	162	3,340	539	1:43
Toshiba T4900CT	66	8.1	404	692	141	2,762	490	1:59

CD-ROM Software

Corel CD Creator: Let There Be CDs

BY JAMES KARNEY

Until now, CD-recordable (CD-R) technology has been so expensive and complicated that it was virtually unapproachable for the average PC user. Whether it is for data, music, or mixed media, Corel is aiming to bring CD-R into the mainstream with its \$249 CD Creator package. Of course, you'll still need a CD recorder, but this Corel software is the easiest way to cut a disk.

CD Creator's strength is that you don't have to learn the arcane technology of premastering disks in order to put data on a disk. The program contains three modules: an audio editor for laying out music tracks, a data editor for designing data CDs, and a jewel-case designer for producing the inserts for music CDs.

FILE BY FILE

The data and audio editors work much like the Windows File Manager, allowing you to drag and drop files into the emerging CD-ROM. As the CD takes shape, a listing of the files used is shown in a tree structure. As the file fills, a status bar located below the file area shows the estimated free space left on the target disk and the amount of hard disk space required for the temporary files. But that is about as far as CD Creator goes, because it has no simulation utilities that show what the CD will look like before burning the disk.

Once the structure and selections have been made, you can save the layout for future use—a handy feature for those who create regular data backups or data distribution disks. Filling up the CD is a semi-auto-

mated process. For example, audio tracks can be listed with the track title and artist, and CD Creator will automatically add the playing time.

Don't let the program's low price fool you: It offers some very sophisticated safety features that are often absent on more expensive products. For instance, we found the program quite useful for testing our system's CD-ROM for proper audio extraction, for testing the ability of our hard disk to supply data to the recorder, and for testing the recorder itself for proper operation and available writing speeds. All the tests are contained in one easy-to-use dialog box.

CD Creator's hardware requirements are substantial. You must have a compatible ASPI-based SCSI host adapter running on your PC, along with a

format and can be used to copy files from local drives, CD-ROM readers, and network drives. For our evaluation, we used a Kodak PCD-200 Writer.

Our first disk was created without incident by using the program's Disc Wizard to copy files from our local hard disk. As each directory or

file was selected, a status bar in the CD Creator window showed the total amount of space allocated and how much was left. The 610MB disk was cut in 42 minutes without a problem.

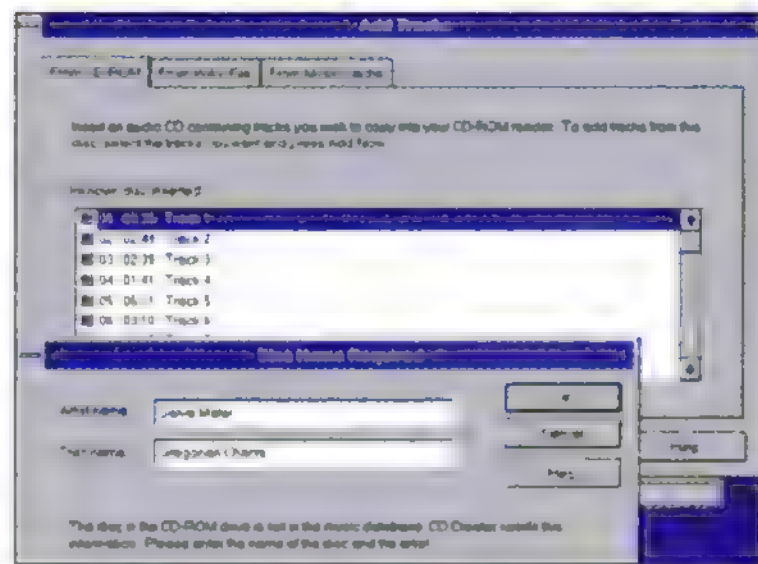
CRASH...NO BURN

Next, we tried to back-up 630MB of assorted files, including some very large graphics images, from a NetWare 3.12 network. Moving this data caused other CD-R products to choke, each time trashing a \$20 disk. CD Creator stopped dead

before starting to write to the disk. Closer examination revealed that one source file had an incorrect creation date, which halted the program. After removing it from the list, everything worked perfectly.

A bit of advice: If you plan on copying files larger than 20MB from a SCSI drive, we recommend that the drive and the recorder be set up on separate matching adapters. Having them on the same card can overrun the buffer and ruin the target disk.

Audio recordings showed another potential snafu. Our NEC 4X CD-ROM was based on early firmware, which was not up to the task, and the result was that it took 11 hours to



MUSIC MASTER: Make your own music CDs either from scratch or by copying from other sources; the tracks' times are automatically inserted.

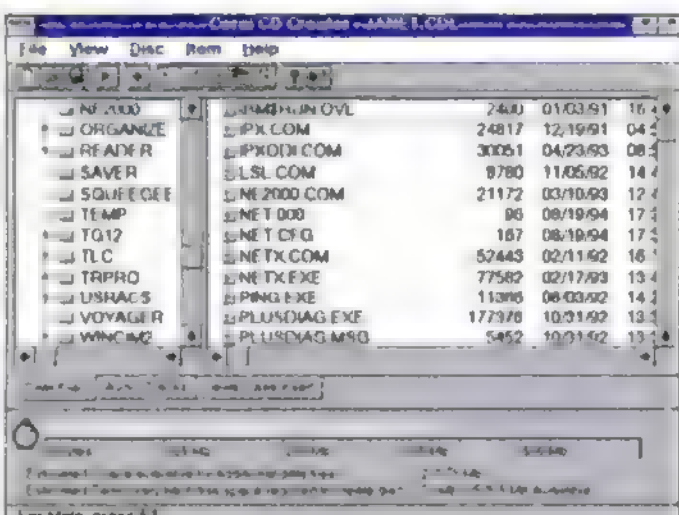
record a 62 minute audio CD. In addition, the CD had pops and other noise when played. We replaced the NEC unit with a newer Plextor 4Plex drive and copied the disk in a little over 2 hours; the fidelity was excellent.

All told, CD Creator does an excellent job of masking the complexity of recording a CD, regardless of whether the content is data, music, or mixed media. Other mastering packages, notably Easy CD Pro and Simpli-CD, fail to measure up in this area. Neither incorporates Wizards, includes full diagnostic analyzers, or uses as wide a variety of recordable hardware.

Yet as good as it is, CD Creator lacks some features found on more expensive products. The most glaring absence is the lack of mastering modes that let the user model the structure of a CD-ROM on a hard disk. But most people don't need such high-end tools to make a quick backup or cut their own music CD. Simplicity is the watchword with CD Creator.

► **Corel CD Creator.** List price: \$249. Requires: 8MB RAM, 6MB hard disk space, SCSI host adapter, Microsoft Windows 3.1 or later, compatible CD-Recorder, 16-bit sound card, digital audio CD-ROM drive for recording from audio CDs. Corel Corp., Ottawa, Ontario, Canada; 800-772-6735, 613-728-8200; fax, 613-761-9176.

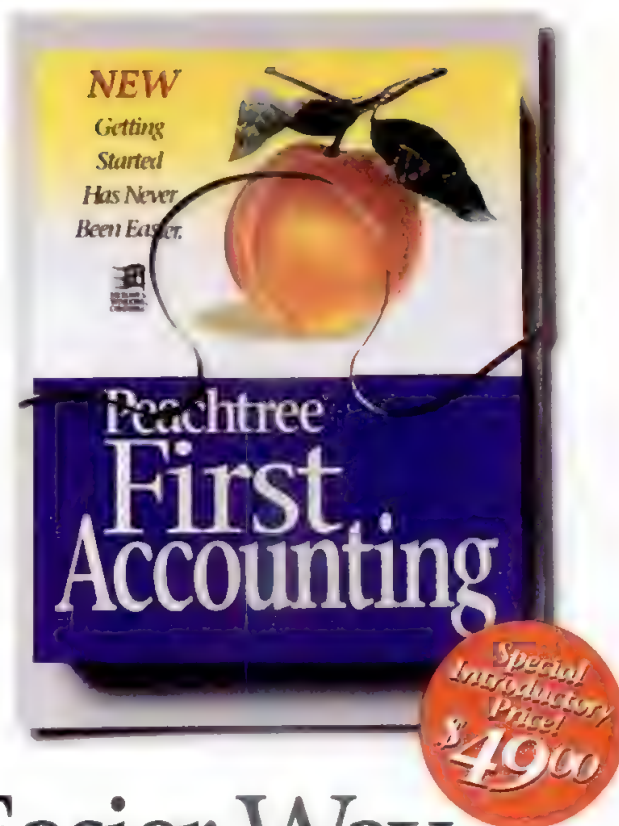
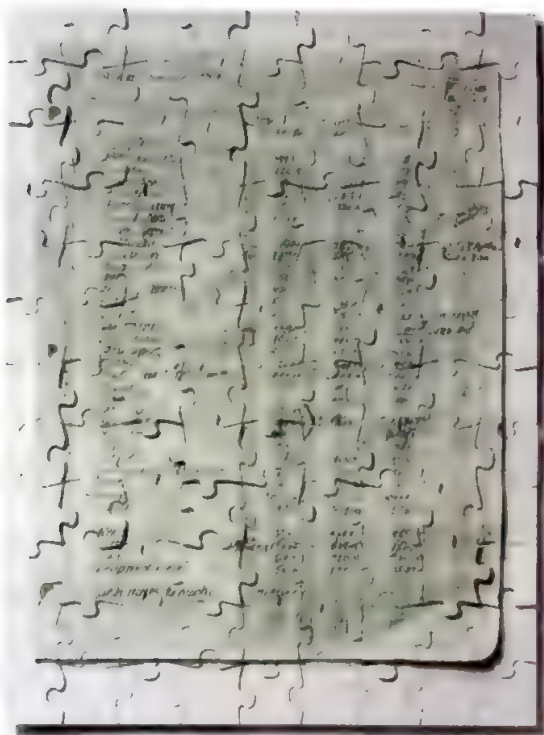
Circle 440 on reader service card



WHAT'S LEFT?: The bar graph at the bottom of CD Creator's interface shows how much of the target disk's capacity remains to be filled.

supported CD Recorder. If you plan to produce digital audio CDs, a CD-Digital Audio drive is required. Happily, Corel publishes a list of those CD-R drives that are compatible (the company says it will update the list monthly).

CD-Creator conforms to the ISO 9660 CD-ROM standard



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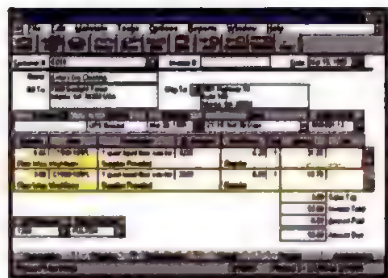
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CIRCLE 393 ON READER SERVICE CARD

Personal Information Managers

Organizer Reaches Out to the Workgroup

BY GREGG KEIZER

Lotus Organizer, Release 2.0, the latest incarnation of Lotus's popular personal information manager, manages to incorporate some serious group-scheduling skills without damaging its reputation as one of the easiest-to-use PIMs available. The \$99 package retains its Day-Timer-like notebook look, with a ring binder motif and dog-eared page corners. You can add new sections, customize old ones, and navigate through the entire notebook by clicking on page corners and tabs. But the scope of Organizer has been increased with the addition of features commonly found in contact management software and a change in focus from the individual to the group.

PHONE HOME

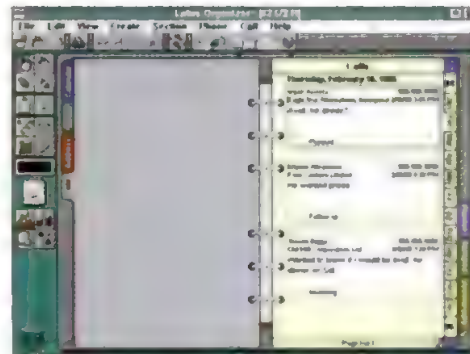
An addition to Organizer's traditional six-pack of applets (which includes an address book, an anniversary reminder, a calendar, a notepad, a planner, and a to-do list) is the call module, which lets you organize and store contact information for both incoming and outgoing phone calls. This powerful new feature enables Organizer to compete with dedicated contact managers.

We found one of Organizer 2.0's most useful features to be its ability to create recurring appointments (and even mark a meeting as tentative). Unfortunately, to input changes to a meeting's time, you still must rely on a cumbersome slider-like device that expands and contracts to reflect a meeting's duration; the addition of typed-in times would help.

As in earlier versions, Organizer 2.0 lets you turn the calendar into a one-stop scheduler that displays items from the other modules. Organizer's new merge feature synchronizes a pair of

calendars from, for instance, a desktop and a notebook.

Organizer also tackles the tougher job of resolving group schedules, and by doing so shifts



TELE-CONNECT: Organizer's new call module lets you track incoming and plan outgoing phone calls.

its focus to the workgroup. The program allows multiple users to access a shared calendar simultaneously. You can set access privileges for any calendar (to let an assistant book appointments, for example).

The program's group scheduling piggybacks atop Notes 3.x and cc:Mail 2.x, using those packages' e-mail address books to select attendees, send invitations, and receive responses. Scheduling agents process the meeting notices automatically and administer resources such as rooms and presentation equipment.

Setting up Organizer for Notes or cc:Mail is a task best left to the LAN administrator or MIS department; it's a complex chore that has a steep learning curve and requires considerable preparation. Networked users who don't have Notes or cc:Mail actually have it easier, as Organizer can reconcile schedules in shared files residing on a single server, which is much easier to set up.

No matter how group

scheduling is established, the end result is the same. Organizer lets users view occupied time on one another's calendars, find a suitable free time for a group wish-

ing to meet, book resources, invite attendees, and attach files to a meeting notice. Replies are sent via e-mail or to the single-server mailbox, where they can be viewed from within Organizer. Unfortunately, Organizer does not display the meeting's status—who's coming,

who's not—unless you click open the appointment. And the program does not allow participants to hide from network scheduling and block out personal time.

ANCHOR'S THE WAY

Enhancements to other sections of the package are less impressive, but nonetheless increase Organizer's reach. You can now display the to-do list by category, date, priority, or status; specify a completion date; attach alarms to a task; and create recurring to-do items. You can set up the notepad as an elemen-

tary application- and document-launching pad. And the program's Anchor tool lets you manually connect various pieces of information throughout the program. For example, you can link a name in the address book to a to-do task.

Organizer 2.0's calendar adds a monthly view in addition to the annual, biweekly, weekly, and two-day snapshots found in its predecessors. Furthermore, you can now set conflicting and overlapping appointments. If you tell it to, the program will notify you of the time conflict by highlighting the day and the offending appointment in red.

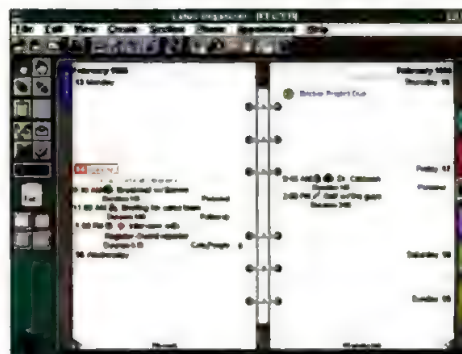
Still, there are a couple of weak spots. For one thing, you can view only one module at a time, navigation relies too heavily on the mouse, and there are only two notes fields for each entry in the address book. In addition, cross-referencing information is harder than in a package such as Ecco, since you must manually connect each item. The biggest problem with Organizer, however, is that it is very slow.

For many users, however, these will be minor quirks. Organizer holds an enviable position in the PIM world: The program is easy to use regardless of whether it is holding one's

information or serving as the caretaker for a group's appointments and contacts.

► **Lotus Organizer, Release 2.0.** List price: \$99; upgrade from prior versions, \$49. Requires: 4MB RAM (6MB for group scheduling with Lotus Notes), 8MB hard disk space, Microsoft Windows 3.1 or later. Lotus Development Corp., Cambridge, MA; 800-343-5414, 617-577-8500.

Circle 403 on reader service card



CONFLICT RESOLUTION: With Release 2.0, Organizer can now book overlapping appointments, highlighting the conflict here in red.

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➡➡➡ **FEATURES** ◀◀◀

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■ Contact Management

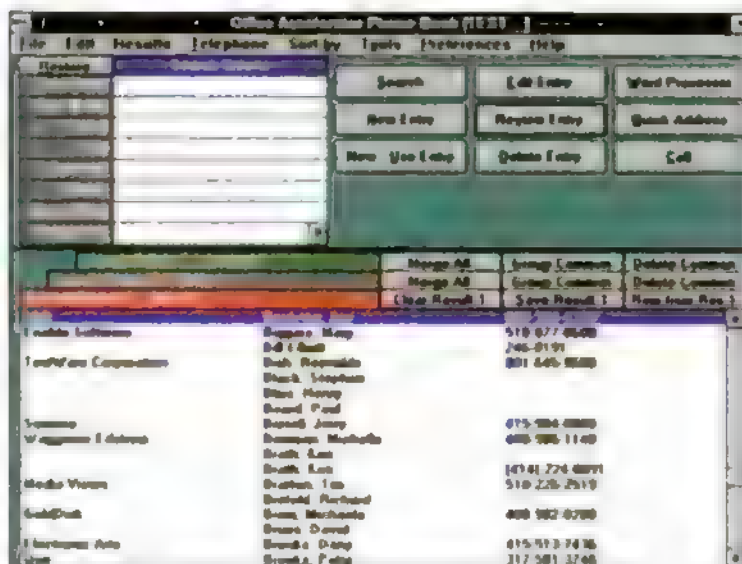
Office Accelerator: Contact Manager And Word Processor Team Up

BY DAVID HASKIN

Office Accelerator 3.0 is a tightly focused tool for those who collect contact names and need to use them quickly. This \$99.95 add-in contact database for several popular word processors is neither as full-featured as contact managers like ACT! nor as powerful as free-standing database programs. But by offering a much quicker and simpler approach to performing basic everyday tasks like creating form letters and finding phone

field attributes. Also, we were able to search the contents of the freeform notes field, which can hold up to 32K of text for each record. This makes OA handier as a light-duty contact manager.

As with previous versions, you can mix and match the results



WORD POWER: Office Accelerator works with word processors and can conduct searches.

of up to three separate searches. For example, we started with a search for all contacts in a specific state, and then conducted another search for all contacts classified as hot sales leads. By

clicking on a button, we were able to combine the results of both searches. The more we used this feature, the more uses we could find for it.

Unfortunately, combined

searching is as close as OA gets to Boolean AND, OR, and NOT searches; combining the results of two separate searches simulates using the AND operator in a single search. Furthermore, OA doesn't support wildcard or sound-alike searches (useful for finding misspelled or phonetically spelled names or places). And OA's interface is crowded and sometimes confusing.

Even with these shortcomings, however, OA's superb integration makes it a good tool for word processing mavens. If you depend on correspondence but don't need the power and complexity of a contact manager, OA is an excellent choice.

► **Office Accelerator, Version 3.0.** List price: \$99.95. Requires: 4MB RAM, 3MB hard disk space, Microsoft Windows 3.1 or later. Baseline Data Systems Inc., Torrance, CA; 800-429-5325, 310-214-8528; fax, 310-214-8529.

Circle 541 on reader service card

FIRST LOOKS PLUS

From February 27 through March 3, you can go on-line to download a demo of Baseline Data Systems' Office Accelerator or to discuss the program with reviewer David Haskin, Baseline president Chris Furgis, and support manager Tony Hebert. Type GO ZNT EXEC from any CompuServe! prompt.

want to retrieve. OA displays a dialog box for fine-tuning, enabling you, for example, to change the salutation for a letter or select an appropriate type of label. The program then either prints the task or inserts the relevant information into your word processing document.

Baseline Data Systems has enhanced OA's database capabilities. For example, we found that we could create as many as 100 custom fields and define

■ Document Management

File Magic Plus Expands Data Entry and Retrieval Horizons

BY J.W. OLSEN

Last year, despite interface weaknesses, Westbrook Technologies' File Magic Plus won our Editors' Choice award for image management software ("Paper Shredders," June 14, 1994) because of its overall power and search flexibility. Now, with new versions of both the standalone File Magic Plus Professional (reviewed here, \$1,795) and the LAN version, File Magic Plus Workgroups (10 users, \$8,495), the company offers an improved interface and expanded functionality.

Westbrook has relaxed the learning curve by simplifying File Magic Plus's interface and providing pop-up Cue Cards. But the most useful enhancement is the program's ability to open simultaneous windows, switch between them, and per-

form tasks in the order that makes the most sense to you.

You can now preview scanned documents before you commit them to a database. In addition, File Magic Plus can create scripts to automatically index documents as they are captured.

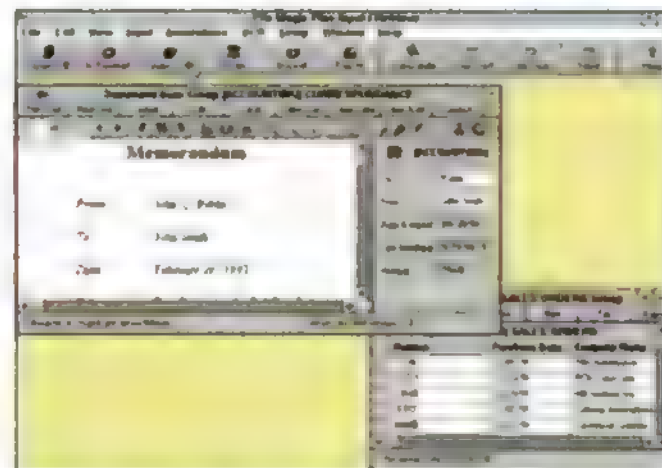
The program is now fully OLE 2.0 compliant, making it an extremely flexible document management system. You can add OLE objects within File Magic Plus documents

or use the program as a server within files created by other apps. You can also add comments and highlighting.

Most notably, File Magic Plus now supports unlimited databases, so you can create separate systems for different

tasks. Querying permits multiple variables and search narrowing, while indexing can be qualified through masks, pick lists, ranges, or unique values.

With its enhancements, File Magic Plus Professional extends Westbrook Technologies' lead in the image management and retrieval arena.



OVERLAPPING IDEAS: File Magic Plus now permits multiple simultaneous view.

► **File Magic Plus Professional 4 Series.** List price: \$1,795. Requires: 8MB RAM, 12MB hard disk space, Windows 3.1 or later. Westbrook Technologies Inc., Branford, CT; 800-949-3453, 203-483-6666; fax, 203-488-8366.

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CIRCLE 226 ON READER SERVICE CARD



Any way you look at it.

Fax

Colorize Your Faxes with FaxConnection

BY ALFRED POOR

Color is taking the office by storm. Only a few holdouts still use monochrome monitors, and color printers are beginning to make black-and-white reports and presentations seem old-fashioned. But when the fax line rings, you're still limited to black print on a white sheet, right? Wrong. With the \$695 FaxConnection MFP board from Extended Systems, you can send and receive full-color faxes through many popular color printers. In most cases, though, delivery via traditional electronic mail might make more sense.

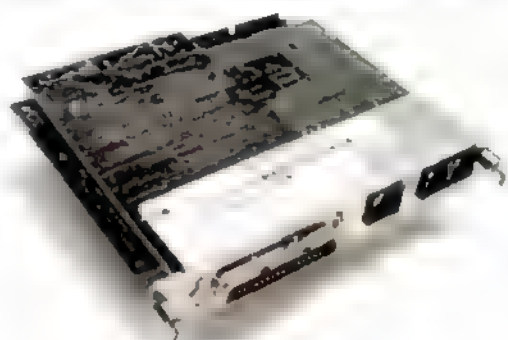
The key component in the FaxConnection MFP is a card designed to fit in the MIO (multipurpose input/output) slot of Hewlett-Packard printers. Slide it into the slot on an HP LaserJet IIISi, HP LaserJet 4, HP LaserJet 4 Plus, or HP LaserJet 4Si and you automatically add the ability to send and receive faxes with any CCITT Group III fax machine.

The big news is that when the MFP card is installed in one of HP's color printers, such as the HP DeskJet 1200C, the machine can send and receive in color. Because of its ability to reproduce rich, saturated colors as well as crisp lines, we chose to test the MFP system on the HP Color LaserJet printer.

Because the FaxConnection MFP can transmit images using either PostScript fax or PCL fax modes, we were able to print on a remote printer about as easily as on a local printer. For example, a file faxed from Idaho to PC Labs in New York looked just as good as when printed locally. This system could be extremely handy for anyone needing to transmit color images with minimal hassle and user intervention.

THE PRICE OF CONVENIENCE

You pay for this convenience, however, even beyond the \$695 list price for the base model, which comes with a 512K buffer; a system with 1MB of memory costs \$890. If your printer has only a single MIO



INSTANT COLOR: With this board, your color printer becomes a color fax machine.

slot, which is the case on all but the Si models in the LaserJet line, you'll have to choose between color faxes and a network adapter. If you want to remain connected to your office's network, you can use the Pocket-FaxServer, a \$205 option from Extended Systems.

There are other considerations, even in single-user in-

stallations. Although the FaxConnection MFP will buffer an incoming fax job if the printer is busy, the printer is not available for local use while a fax is being printed. It would be much better if waiting local print jobs could also be buffered.

SLOW GOING

There's also the issue of how long each page takes. The FaxConnection MFP works only at speeds of up to 9,600 bits per second, which is standard for fax transmissions. This is a tad slow in an era where 14.4 kilobit-per-second modems are practically commodity items and 28.8-Kbps V.34 modems are rapidly becoming the standard.

It took about 30 minutes to transmit a 1.5MB file using the system's binary-file-transfer feature, 10 minutes to transmit a full-page color image of text and graphics, and almost 2 minutes to transmit a 3-inch-square color bitmapped image at 300-dot-per-inch resolution.

The bottom line is that in

just about all cases it would be faster—though much less convenient—to use e-mail or modem-to-modem transfers to move graphics. The main advantage offered by the FaxConnection MFP is that it requires no user intervention on the receiving end. In this regard, the FaxConnection MFP is as easy to use as a standard fax machine. That is, all you have to do is periodically empty the tray of received faxes.

While the color capability that the board gives you is a considerably attractive feature, the FaxConnection MFP will probably have limited appeal until color printers that support it become more common.

► **FaxConnection MFP.** List price: Base model with 512K buffer, \$695; with 1MB buffer, \$890; with 1MB and Pocket-FaxServer, \$1,095. Requires: Printer with MIO slot. Extended Systems Inc., Boise, ID; 800-235-7576, 406-587-7575; fax, 208-377-1906.

Circle 401 on reader service card

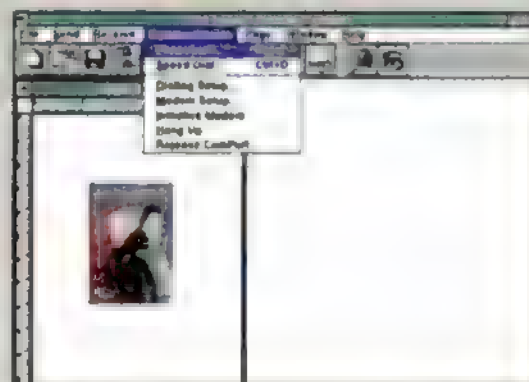
■ ColorLink: The Software Way to Send Color

If you don't have an HP Color LaserJet or HP DeskJet 1200C you can still send color images. ColorLink Universal, from Laser Today International, is a \$445 program designed to make it easy to send and receive color images.

This Windows program can send color images via most major data modems to a receiving computer. The package includes a receiver version of the program, which only lets you receive and save images. Inbound images are automatically saved on-disk, printed, or displayed.

Though ColorLink does make the transfer of images easy, there are still some snags. You

have to convert images to graphics files before you can send them, which means that you cannot create a Microsoft Word for Windows document and send the pages directly. Some users may find the convenience worth the cost, but others may find that e-mail or a traditional communications package can perform equivalent functions with fewer steps.—AP



COLOR LINK: Makes it easy to send color graphics files between computers with data modems.

► **ColorLink Universal.** List price: \$445. Requires: 6MB RAM, 1MB hard disk space, compatible data modem, Microsoft Windows 3.1 or

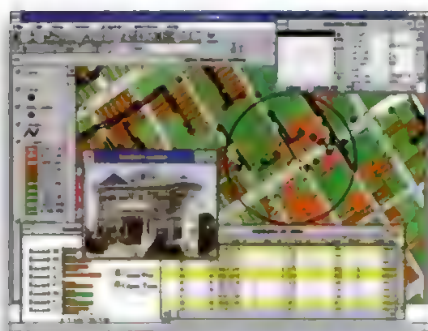
later. Laser Today International Inc., Mountain View, CA; 415-961-3015; fax, 415-961-7631.

Circle 402 on reader service card

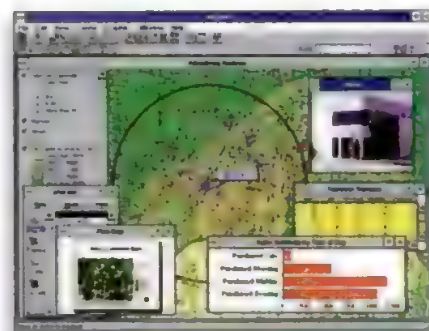
"ArcView is Hot..."

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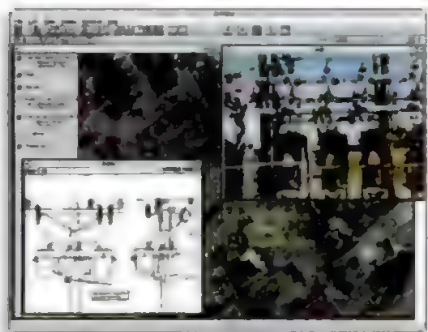
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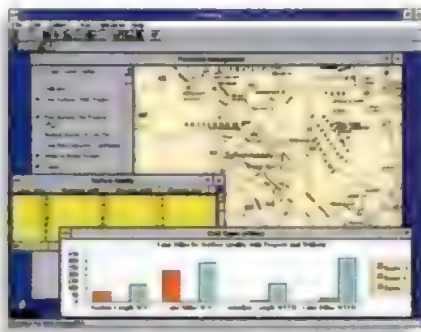
Government



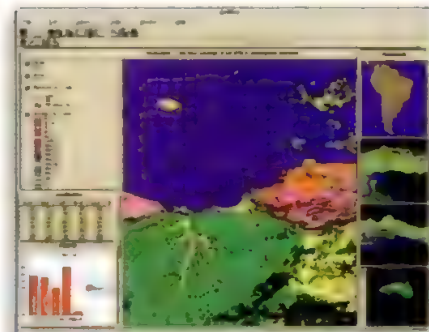
Business



AM/FM



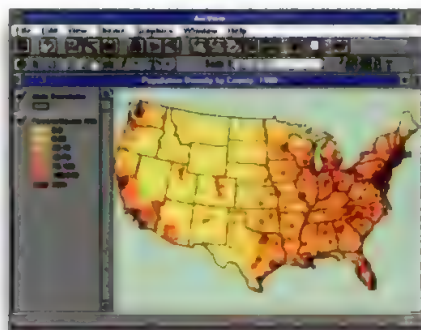
Transportation



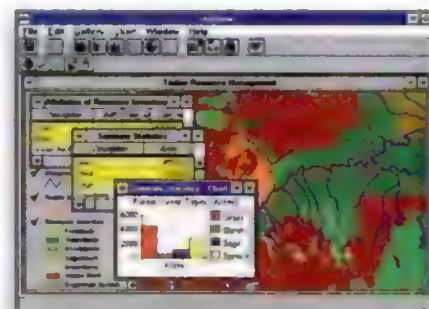
Petroleum

"ArcView 2 is an extraordinary product. The interface is excellent, as are its query and display capabilities...Avenue is an impressive scripting language, affording the user a wide range of customization options. The map composition features also receive high marks, making it a snap to get cartographic output...an effective tool that goes far beyond simply mapping data."

-John C. Cartwright,
GIS World Magazine



Demographics

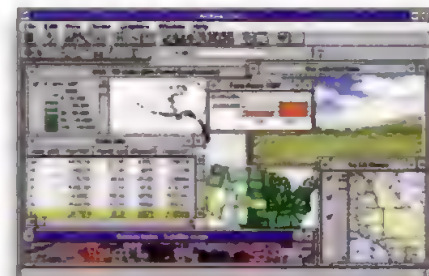
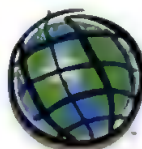


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CIRCLE 207 ON READER SERVICE CARD

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■ Laser Printers

LaserMaster's WinPrinter 1000: High Resolution at About a Dollar a Pixel

BY DANIEL GROTTA &
SALLY WIENER GROTTA

While perfectly adequate for general business use, 300-dot-per-inch laser printers are woefully inadequate for the graphics and typesetting needs of people who produce newsletters and brochures. And while 600-dpi printers have significantly better resolution, they still fall short of the 1,000 dpi you really need for smoothly formed fonts and graphics.

LaserMaster Corp.'s \$1,095 WinPrinter 1000—by far the least expensive printer in the high-resolution market—is PostScript-compatible, and can reproduce both 256 gray scales and camera-ready halftones. While the WinPrinter 1000 can be the functional equivalent of a type shop for your office, it is not as ruggedly engineered as many of its higher-priced competitors. In its defense, the printer does offer extraordinary value.

Because it is capable of producing graphics and text output suitable for reproduction at 85 lines per inch, the WinPrinter 1000 is good enough for producing most newspapers, newsletters, and even some magazines printed on noncoated stock.

Although based on the same 300-dpi Canon PX laser engine that the HP LaserJet 4L uses, the WinPrinter 1000 includes much of its own homegrown engineering. The most impressive addition is LaserMaster's patented TurboRes technology, which boosts resolution, provides gray-scale capability, and virtually eliminates aliasing.

Other enhancements include HP LaserJet II and PostScript Level 1 emulation, NetWare compliance, a high-speed parallel-port controller board, and 50 TrueType and 4 PCL4 fonts. Emphasizing its flexibility in a production setting, the WinPrinter also has a dedicated printer driver for generating thumbnails, printing odd- and even-numbered pages, and creating other special formats.

GOOD NEWS...

The good news is that our testing showed the WinPrinter 1000 to be capable of generating excellent-quality text and graphics formatted for up to 8.5-by 14-inch paper. At least to the

better-looking halftone patterns.

In the Windows direct mode, the WinPrinter 1000 is also very fast, able to deliver the first print within seconds of the file being transmitted from the PC. LaserMaster's drivers and utilities also make it easy to manage fonts, change resolutions, establish the queue order, and set the system up as a network printer.

...BAD NEWS

The bad news is that, like the LaserJet 4L, LaserMaster's WinPrinter 1000 is a lightweight functionally. In order to keep the price down, LaserMaster did not give the unit its own microprocessor. That means it must function as a dumb printer, running piggyback on your computer's processor and system memory.

The more powerful your PC, the faster the printer works and the higher resolution output it can produce. With 8MB of RAM installed in our system, we found maximum resolution to be limited to 300 dpi or 400 dpi. But with 16MB of memory, we could print at 1,000 dpi.

The duty cycle is a decidedly modest 1,000 pages per month, and total engine life expectancy is only 100,000 copies. So while it can be configured as a Novell printer, the WinPrinter 1000 may not have the ruggedness to stand up to a high-volume environment.

Oddly, the printer has neither an on/off switch nor a reset button. It does, however, have a power-saving idle mode, which draws less than 5 watts.

The printer's flimsy paper tray holds only 125 pages and cannot automatically detect when a single sheet or an enve-

lope is fed in manually. Unless you go into the printer setup utility or create a macro in your application to change between the tray and manual feed, the printer will jam and can be devilishly difficult to clear without ripping the paper.

ROUGH START

Installation was problematic at first. The high-speed parallel interface board that is included offers only limited IRQ and DMA choices, and the documentation assumes the fault is with the other components. It also suggests that if there is a conflict with other devices or peripherals, you must reconfigure the nonprinter hardware before changing the printer's settings.

Because the software cannot prediagnose conflicts, we spent several frustrating hours getting the board to work. Once the board was installed correctly, however, we found that setting up the drivers was a piece of cake.

The WinPrinter 1000 is not really suited as a high-volume or network printer. If, however, you need camera-ready copy—or want a light-duty desktop printer with top-quality output—it does a superb job at a price that is hard to beat.

For anyone producing newsletters or other moderate-resolution printed material, the WinPrinter 1000 can save thousands of dollars in typesetting costs and halftone plates.

► **WinPrinter 1000.** List price: \$1,095. Requires: 10MB RAM (16MB recommended), Microsoft Windows 3.1 or later. LaserMaster Corp., Eden Prairie, MN; 800-365-4646, 612-944-9330; fax, 612-944-9519.

Circle 439 on reader service card



LOTS OF DOTS: LaserMaster's WinPrinter 1000 produces high-quality 1,000-dpi output, but is not designed for a high-volume environment.

untrained eye, the printer's output was virtually indistinguishable from that of LaserMaster's \$9,995 1,800-dpi printer.

Type is well formed and evenly spaced, and the microtoner is very clean and sharp. Another advantage of the printer is its Automatic Pattern Selection, which automatically replaces many programs' dithering patterns for creating gradients and continuous tones with

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"The (Pantera) Pentium units' Winstone 95 performance was outstanding, each system leading its respective tier."

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December 6, 1994**

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**-PC Magazine,
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"A standout in speed and value... we suggest you spend your money on this machine—it offers the best value of any system we tested."

**-PC/Computing,
May 1994**



Pentium-66
April 12, 1994
DX4-100
June 28, 1994



Pentium-60
April 1994
Pentium-90
August 1994



486DX2-66
January 1994
February 1994
March 1994
June 1994
December 1994
January 1995
February 1995
DX4-100
October 1994
November 1994
December 1994
January 1995
February 1995
Pentium-60
December 1994
January 1995
Pentium-66
June 1994
July 1994
August 1994
September 1994
Pentium-90
August 1994
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January 1995
February 1995



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May 1994



Pentium-66
June 1994
Pentium-90
August 1994



Pentium-90
November 1994



486DX2-66
March 1994

Package 1		Package 2		Package 3		Package 4	
486DX2-50	\$1345	486DX2-50	\$1645	486DX2-50	\$2145	486DX2-50	\$2545
486DX2-66	\$1395	486DX2-66	\$1695	486DX2-66	\$2195	486DX2-66	\$2595
DX4-100	\$1545	DX4-100	\$1845	DX4-100	\$2345	DX4-100	\$2745
Pentium-60	\$1645	Pentium-60	\$1945	Pentium-60	\$2445	Pentium-60	\$2845
Pentium-75	\$1695	Pentium-75	\$1995	Pentium-75	\$2495	Pentium-75	\$2895
Pentium-90	\$1995	Pentium-90	\$2295	Pentium-90	\$2795	Pentium-90	\$3195
Pentium-100	\$2195	Pentium-100	\$2495	Pentium-100	\$2995	Pentium-100	\$3395
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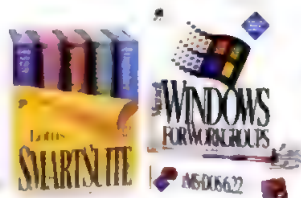
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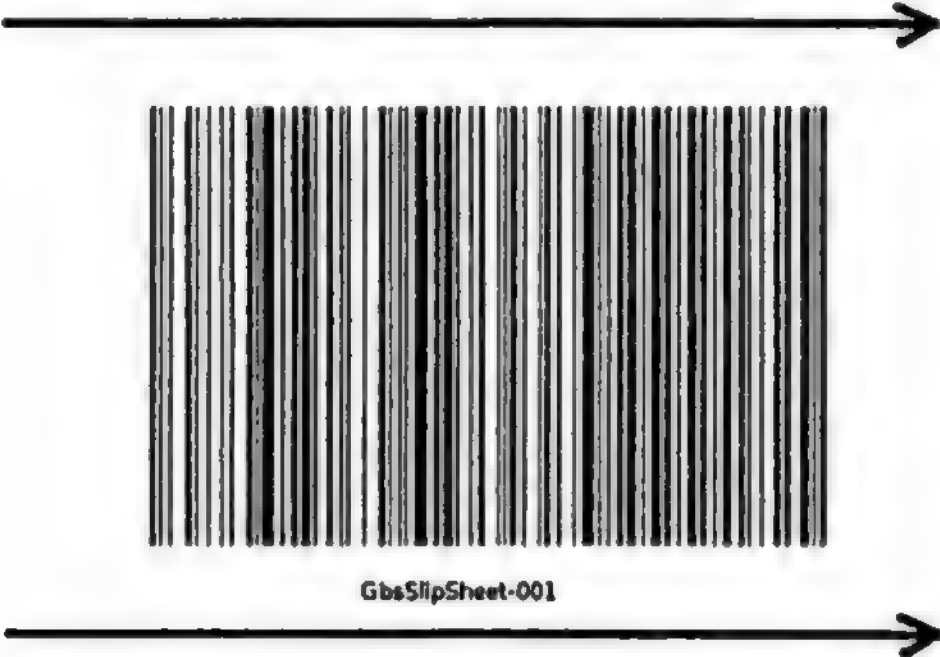


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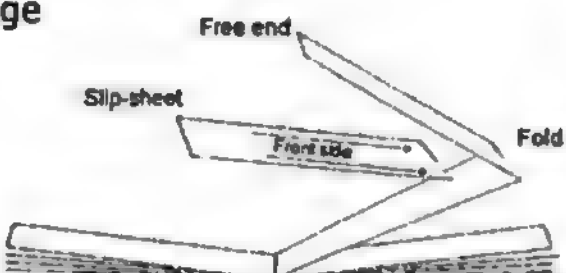
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
 3. Slice the folded edge
 4. Close the page and slip-sheet

Folded edge of the page

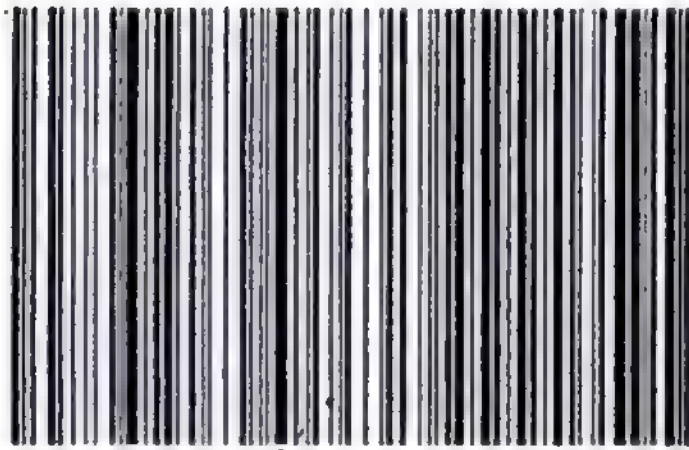


1. Front side touching the free page
2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



GbsSlipBack-0018

Back

1. Follow instructions on the other side

ZEOS Panthera— A Vision That's Real.

There's no illusion here. Truth revealed: ZEOS Panthera is your No. 1 high-performance desktop system. Leading experts from top industry publications agree. Unparalleled in its field, the Panthera has continuously earned award after award—review after review.

Month after month, the ZEOS Panthera outranks all others in performance, reliability, and value. It's the biggest bang for your buck. As *PC Magazine* said: "Overall performance leaders... the Panthera line has a lot to offer—strong performance at a reasonable price, with excellent documentation."

Continuing with the ZEOS tradition of providing you with top performance, unwavering reliability and exceptional value, the ZEOS Panthera is giving you a new way of looking at the world.

Striking Performance



The Panthera, based on Intel's 486, DX4 and Pentium processors, is break-

ing record after

record with its blazing performance and awesome power.

In *PC Magazine's* December 1994 Pentium and 486 round-up, they gave top honors to the ZEOS Panthera: "Few product lines fared as well in our price/performance index as the ZEOS Panthera family. A major factor in the Panthera units' success was the outstanding Winstone 95 scores: The Pentium machines produced first-place scores in their respective tiers, and the ZEOS 486DX2-66 earned a top-five ranking among the entry-level systems."

PC World concurred: The Pentium-66 and Pentium-90 processor-based Panthera PCs were "the fastest system(s) ever tested... Mark a new high on the performance chart!"

What makes the Panthera the top performer—time after time? Superior engineering—starting with a ZEOS designed motherboard created specifically to take full advantage of the latest

technological advancements. The motherboard is loaded with exceptional features such as an on-board PCI Local Bus IDE Controller and support for up to four IDE devices. For the fastest video performance, the Panthera includes a 64-bit Diamond Stealth PCI video card *standard*. For

the quickest data throughput, most Panthera packages also include a 4X CD-ROM drive.

As *Windows Sources* said: "The clear winner is the ZEOS Panthera. Its scores were the best across the board."

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The ZEOS Panthera is a first-rate example of ZEOS' commitment

to provide you with an excellent value on an award-winning machine. With all the extras, options, and 100% compatibility with all major operating systems—including Novell NetWare and OS/2—you can't go wrong.



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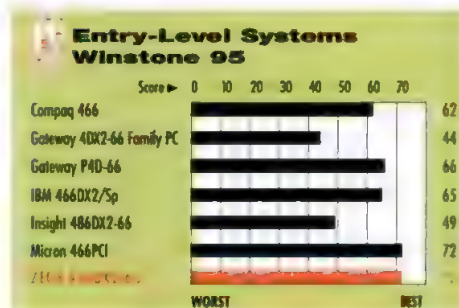
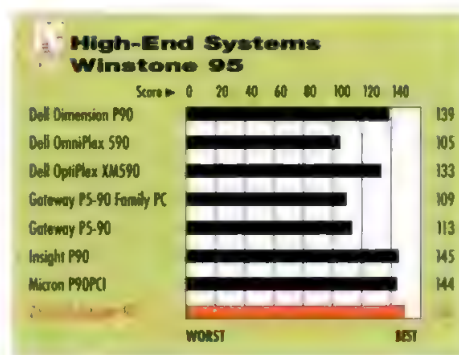
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the Panthera "... is a deal you simply can't pass up."

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Reprinted from *PC Magazine*, December 6, 1994

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486DX2-66 \$1695
Pentium-60 \$1945
Pentium-75 \$1995

Package #2:

- 8MB RAM
- 528MB local bus IDE hard drive
- 4X CD-ROM drive, 3.5" 1.44MB FDD
- Diamond Stealth 64-bit PCI local bus SVGA graphics card with 1MB DRAM
- 14" SVGA color monitor
- 6-bay desktop case
- MS-DOS, Windows for Workgroups, Microsoft Mouse



486DX2-66 \$2095
Pentium-75 \$2395

Top Gun:

The above system modified to include:

- 128K SRAM cache (486), 256K SRAM cache (Pentium)
- Diamond Stealth 64-bit PCI local bus graphics card with 2MB VRAM
- 15" SVGA color monitor upgrade
- 14.4/14.4 send/receive fax modem
- Lotus SmartSuite



Pentium-75 \$2595
Pentium-90 \$2895

Editors' Choice:

- 16MB RAM, 256K SRAM cache
- 528MB local bus IDE hard drive
- 4X CD-ROM drive, 3.5" 1.44MB FDD
- Diamond Stealth 64-bit PCI local bus graphics card with 2MB VRAM upgrade
- 15" SVGA color monitor
- 6-bay desktop case
- MS-DOS, Windows for Workgroups, Microsoft Mouse
- Lotus SmartSuite

Pentium-75 \$2745
Pentium-90 \$3095
Pentium-100 \$3295

Hottest:

The above system modified to include:

- 1GB local bus IDE hard drive
- 6-bay desktop case (Pentium-75)
- 10-bay vertical case (Pentium 90 & 100)



Pentium-75 \$3118
Pentium-90 \$3418

Best MM:

- 16MB RAM, 256K SRAM cache
- 528MB local bus IDE hard drive
- 4X CD-ROM drive, 3.5" 1.44MB FDD
- 16-bit sound card, stereo speakers
- Diamond Stealth 64-bit PCI local bus graphics card with 2MB VRAM upgrade
- 17" SVGA color monitor
- 10-bay vertical case
- MS-DOS, Windows for Workgroups, Microsoft Mouse
- Lotus SmartSuite

Pentium-90 \$3795
Pentium-100 \$3995

Best MM Supreme:

The above system modified to include:

- 24MB RAM
- 1GB local bus IDE hard drive
- Altec Lansing high-power speakers



486DX2-66 \$1245

Package #1:

- 4MB RAM, 128K SRAM cache
- 340MB hard drive
- 3.5" 1.44MB floppy drive
- VESA local bus SVGA color video
- 14" SVGA color monitor
- 4-bay desktop case
- MS-DOS, Windows for Workgroups, Microsoft Mouse



DX4-100 \$2995

Package #3:

- 8MB RAM
- 350MB IDE hard drive
- External 3.5" 1.44MB floppy drive
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- Lotus Organizer
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DX4-100 \$3195

Package #3:

- 8MB RAM
- 350MB IDE hard drive
- Internal 3.5" 1.44MB floppy drive
- Dual-scan color VGA 10.3" display
- Custom carrying case
- Extra battery
- MS-DOS, Windows for Workgroups
- Lotus Organizer
- 8.9" x 11.7" x 1.9"; 6.3 lbs.

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CIRCLE 155 ON READER SERVICE CARD.

Windows Utilities

Screen Thief Steals Windows' Displays

BY J. W. OLSEN

Like its DOS counterpart (reviewed in First Looks, January 25, 1994), Screen Thief for Windows succeeds at expanding the limits of screen capturing. If your needs for turning a screen into a digital image file are demanding, you won't want to miss FormGen's \$29 Screen Thief. It's worth its weight in gold.

Screen Thief hides its depth and flexibility under the cloak of a deceptively simple interface. The heart of the program is its ability to define up to eight capture types, each with diverse options and a definable hotkey.

The first step in using Screen Thief is to specify an image's source. Besides common choices, such as the entire desktop, a user-outlined area, or an active window, you can use the Windows Clipboard. Most notably, you can capture an active application group while ignoring icons and the other open apps on a typical cluttered desktop. This includes the active application, all of its related open windows (regardless of on-screen location), and the Windows desktop.

Once the source is established, select a destination: Screen Thief itself, a disk, a printer, the Clipboard, or another option. You can define the hotkey and menu name for each of your eight capture types. For tough situations—such as capturing pull-down menus, which normally disappear when you press Screen Thief hotkeys—we found that the delayed capture timer worked well.

Plenty of additional functionality such as scaling and zooming further extend Screen Thief's usefulness. During user-defined-area captures, a pixel-level magnification window pinpoints your

precise target. A color demotion option automatically detects whether your capture area contains fewer than the specified 256, 16, or 2 colors; this can minimize the size of the image file by saving it at the most efficient setting.

As expected, you can save captures in .BMP, .GIF, .PCX, .RLE, and TIFF file formats. Unfortunately, after you save an image you must use another product to view, convert, or otherwise manipulate it. FormGen



VERSATILITY: Using one of eight user-configurable capture types, Screen Thief captures Control Panel, its child window, and the Windows desktop, while ignoring other open applications and icons.

believes that viewing image files is beyond the role of a capture utility, but it plans to market a companion image-manipulation tool eventually.

This weakness aside, Screen Thief provides the versatility you'll need and is one of those delightful utilities that you appreciate more and more with continued use.

► **Screen Thief for Windows.** List price: \$39. Requires: 2K RAM, Microsoft Windows 3.1 or later. FormGen Inc., Bolton, Ontario, Canada. 800-263-2390, 905-857-4141; fax, 905-857-4531; e-mail, info@mildram.com.

Circle 405 on reader service card

Windows Utilities

AIM Tools Tames Your Wildest Applications

BY BARRY BRENESAL

While most macro utilities automate a variety of complex Windows-based tasks, there are always a few programs that stubbornly defy even the most determined attempts at control. This is where Aimsoft Development

about any task. You can define macros based on keyboard input, a mouse click, or mouse movement—individually or in any combination. Although by default the macros created with AIM Tools will play back at the fastest possible rate, you can slow them to one-thousandth of

the recording speed. We found that this was particularly helpful for macros that fill in dialog boxes, where the data can be input before the program is ready to accept it.

You can create toolbars in AIM Tools that are application-specific or Windows-wide, and set them to be floating or anchored, vertically or horizontally. AIM Tools also comes with a num-

ber of preconfigured toolbars for different applications, the most notable of which is ELAN Software Corp.'s excellent information manager, GoldMine for Windows.

Ease of use and understand-

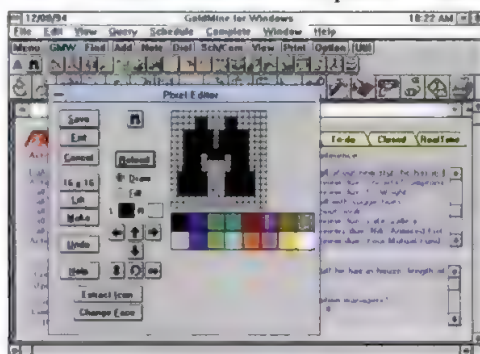
ing, unfortunately, is another matter, because deciphering AIM Tools is far from easy. The biggest snag is that you can't directly create new toolbars within AIM Tools. Instead, we had to edit a preexisting toolbar, then save changes to a new file. In addition, we found the poorly chosen menu and button selections and confusing on-line help hard to navigate through.

AIM Tools could learn from the interface in Softblox's SmartPad (reviewed in First Looks, November 22, 1994), which features extensive context-sensitive help. In addition, SmartPad's macro creation conveys a sense of process—a series of steps that lead to a specific goal.

Without question, AIM Tools 1.0 is the product to include in your Windows workshop if you want macro utilities that will work under all circumstances. But the design can be frustrating, and the learning curve is surprisingly steep.

► **AIM Tools, Version 1.0.** List price: \$99. Requires: 1MB RAM, 1MB hard disk space, Microsoft Windows 3.1 or later. Aimsoft Development Corp., Reno, NV; 800-246-6690; fax, 800-246-6695.

Circle 404 on reader service card



LOOKING FOR NUGGETS: AIM Tools includes GoldMine, an excellent information manager.

Corp.'s AIM Tools, Version 1.0, steps in. While not a bull's-eye, the \$99 AIM Tools package hits the target every time.

AIM Tools puts a variety of useful macro-building tools at your disposal for completing just

Video

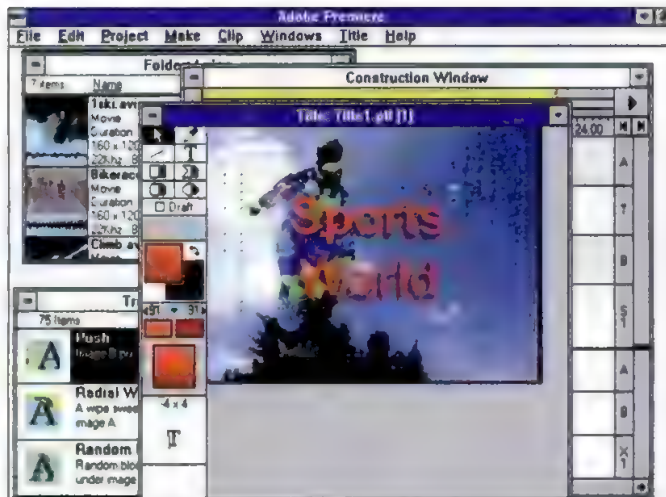
Adobe Premiere 4.0: Video the Professional Way

BY LUISA SIMONE

In its latest release, Adobe Premiere for Windows jumps from Version 1.1 to Version 4.0, showing not only how far this video-editing program has come, but also how fast the state of the art of desktop video is evolving. The \$695 Premiere package catches up with Adobe's Premiere for the Macintosh with features such as titling and motion control, and at the same time leapfrogs over competing products to set a higher standard of functionality. Not meant for everybody, Premiere is a complicated program aimed squarely at the PC-savvy video professional. It requires a significant investment in time and hardware before it pays the dividends of quality video productions.

Building on its original timeline metaphor that allows the overlapping of video and audio clips, Premiere takes a step forward by widening the program's video toolset. While the earlier version could work with only two video tracks and one superimposition track, Premiere 4.0 can handle up to 99 independent video tracks. The closest the competition can offer is ATI's MediaMerge, Version 1.0, which can handle 15 tracks.

Instead of the 4 or 5 standard key types offered by competing products, like Touchvision's CineWorks 1.0, EMC's PrimeTime 5.0, or Asymetrix's DVP 2.0, Premiere gives you 16 different ways to generate transparencies and masking. This allows a tremendous amount of freedom in producing video-in-video and complex overlay effects.



SPELL IT OUT: Premiere's robust Titling module can enhance type with drop shadows and gradient fills.

VIDEOGRAPHIC SYNERGY

The real power of Premiere becomes truly apparent when you begin to combine the program's varied functions. For example, Virtual Clips allows the grouping of up to 16 visual layers into a single entity, which in turn can be placed onto a single video track—turning Premiere's 99 tracks into a nearly limitless number of video streams.

The already diverse palette of image-editing filters and transition effects has been enhanced, as well. Independent start and end options for many of the filters mean that the special effects can be varied over time, creating realistic and at times beautiful effects. For instance, we were able to vary a lens flare over time in a clip to mimic camera motion in and out of the light.

With Adobe's Plug-In architecture, Premiere does not stand still in the rapidly changing world of video. Third party developers can create their own

software filters and transitions, which are much like PhotoShop's Plug-In filters. Premiere also includes a Filter Factory for creating filters from scratch.

Premiere's new Titling module lets you jazz up—with excellent results—Type 1 or TrueType fonts with drop shadows and gradient fills. Two more workaday functions were even more impressive and just about guarantee professional results.

The program's anti-aliasing and Title Safe Area allowed us to produce high-quality titles that didn't appear pixelated on low-resolution monitors and weren't inadvertently cropped when we transferred the clip to videotape.

With Premiere, it is surprisingly straightforward to create complex motion effects such as animating a title, a still image, or a video clip. The center of attention is the Motion Settings dialog box, which details the motion path for an object. A series of self-explanatory slider bars let you set the rotation, zoom, and delay for

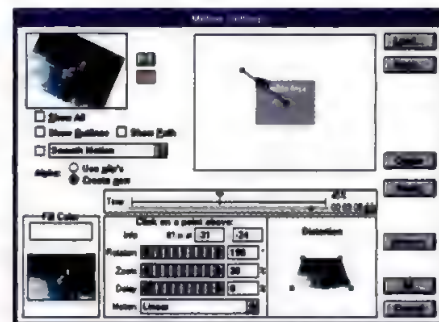
each point along the path. You can even distort the shape of a video clip or vary the speed at which it travels using interactive click-and-drag techniques.

In addition, Premiere's video-editing tools are more precise, setting the pace for the competition. For example, the new Trimming window goes Premiere 1.1's Clip window one better by displaying the ending frame of one clip and the beginning frame of the next. The Trimming window lets you play the cut between the two clips and adjust the respective out and in points frame by frame.

The Clip window itself isn't obsolete: It remains the way to insert markers—up to 1,000 of them—in a movie or sound file. When the Snap to Edges option is active, these markers allow for accurate synchronization between video and audio clips.

LET'S GO TO THE VIDEOTAPE

Small but significant changes that result in productivity gains have been tightly integrated. For example, we found ourselves storing related clips in separate folders before we realized that this was the purpose of the Project window. Once we got the hang of it, this video-in-progress window was perfect for



ALL AT ONCE: The sophisticated motion controls in Premiere allow you to combine several different operations, such as rotation, zooming, and distortion.

holding and organizing all the related materials we were working with.

The new preview options deliver quicker response times by not rendering complicated



From February 20 to February 24, you can go on-line to discuss Adobe Premiere for Windows with reviewer Luisa Simone and Adobe product manager Joyce Chung. Type GO ZNT:EXEC at any CompuServe I prompt.

First Looks

effects. This translates into a real-time down-and-dirty view of the movie, minus the effects. Fully rendered Previews can be saved to disk for future reference, and only those segments that have changed need to be re-rendered for the next preview, which can save time when rendering a complicated video.

In addition to the expected PC standards (VFW, QuickTime, and Autodesk's .FLI/.FLC), Premiere can use device control (via MCI, ARTI, and V-LAN protocols) to capture from videotape in nonreal time. Showing its professional emphasis, Premiere supports a true NTSC frame rate of 29.97 frames per second instead of the more common 30 fps, and doesn't force recompression when both the source and target video files use the same compression scheme. This guarantees higher-quality output when you're working with software-based CODECs that are common to clip libraries.

But by far the most impressive professional aspect of the package is Premiere's ability to create an industry-standard Edit Decision List (EDL). Because of this, you can do all the editing with Premiere off-line and take the EDL into an editing suite to control high-end linear video editing systems.

SERIOUS HARDWARE

Premiere's minimum system requirements should be thought of as its starting point, capable of producing marginally acceptable performance. This program really requires a 66-MHz 486 or Pentium processor, at least 16MB of memory, and hard disk space sufficient for the video files you intend to create.

We encountered only one minor bug during testing. While TrueType fonts disappeared at sizes above 56 points, all we had to do was create the entire titling sequence at a smaller size and utilize Premiere's ability to scale the fonts at output time.

Ultimately, both Premiere's complexity and its power are tied

to its intended audience of professional video producers. If Premiere has a fault, it is that it doesn't try to simplify the admittedly complicated process of producing video. So be prepared for a screen cluttered with various program modules. And while you can assemble a simple movie in minutes, it will take considerable effort to master the breadth and depth of Premiere's nearly limitless toolset. But if a workspace for producing high-quality video is your aim, look no further than Premiere.

Video

Instant Video on Planes, Trains, Ships, and More

BY JAN OZER

By combining a focused selection of high-quality video clips with an excellent search engine, Four Palms' CD-ROM-based Royalty Free Digital Video libraries represent a large step forward in the evolution of video collections. Priced at \$99 for each library—or \$299 for the five CD-ROM set (which contains clips of air, sea, and rail transportation, bridges, and highways), these collections will be valuable assets for those contemplating adding video clips to presentations and training materials.

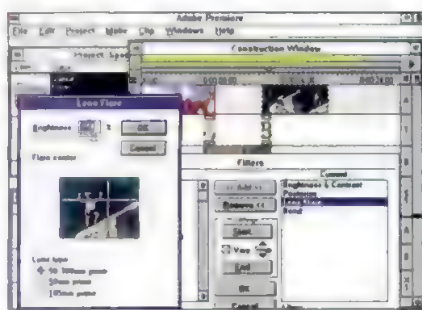
Each library contains over 70 clips that range from 4 to 15 seconds long. Four Palms produced the clips at 15 frames per second in 320-by-240 and 240-by-180 resolutions, enabling the video to be played on a variety of PCs. The clips have been compressed with Intel's Indeo 3.2 technology, which offers high-quality output in both 8-bit and 24-bit modes.

However, while Indeo 3.2 offers wide compatibility and the best software-only video compression algorithm currently available, video quality is still inferior to that produced by VHS videotape or hardware-assisted technologies such as MPEG. This is compounded

► Adobe Premiere for Windows, Version 4.0.

List price: \$695 (until Feb. 15, \$495); upgrade from Version 1.1, \$129. Requires: 8MB RAM (16MB recommended), 100MB hard disk space, Microsoft Windows 3.1 or later. Adobe Systems Inc., Mountain View, CA; 800-833-6687, 415-961-4400; fax, 415-961-3769.

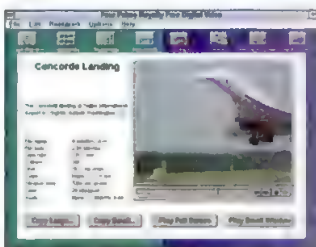
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TIME AND SPACE: With temporal controls (indicated by the Start and End buttons in the Filters dialog box) you can vary a special-effects filter, such as the Lens Flare filter shown here.

somewhat by the high motion content of many of the Four Palms clips, which makes them harder to compress. Four Palms plans to introduce MPEG versions of the collections later in the year.

The depth of content within each category is the product's biggest strength. In the rail



TAKE OFF: Each clip in the Four Palms collection features basic information on the video.

library, for example, Four Palms offers close-ups and panoramas of locomotives, cargo cars, and cabooses from many different angles and backdrops. Most general clip art collections have only one or two clips on a subject.

Four Palms also offers several search paths to fine-tune clip selection. Each collection has a Quick Preview video comprised of 1 second from each clip in the library. Using this feature, we were given a bird's-eye view of the entire

collection in just over a minute.

The program organizes each collection into subjects and displays thumbnails for each clip; double-clicking on the thumbnail plays the video. The playback screen indicates file size, duration, resolution, and data rate. It also provides controls for playing both large and small file resolutions and copying the file from the CD-ROM to your hard disk.

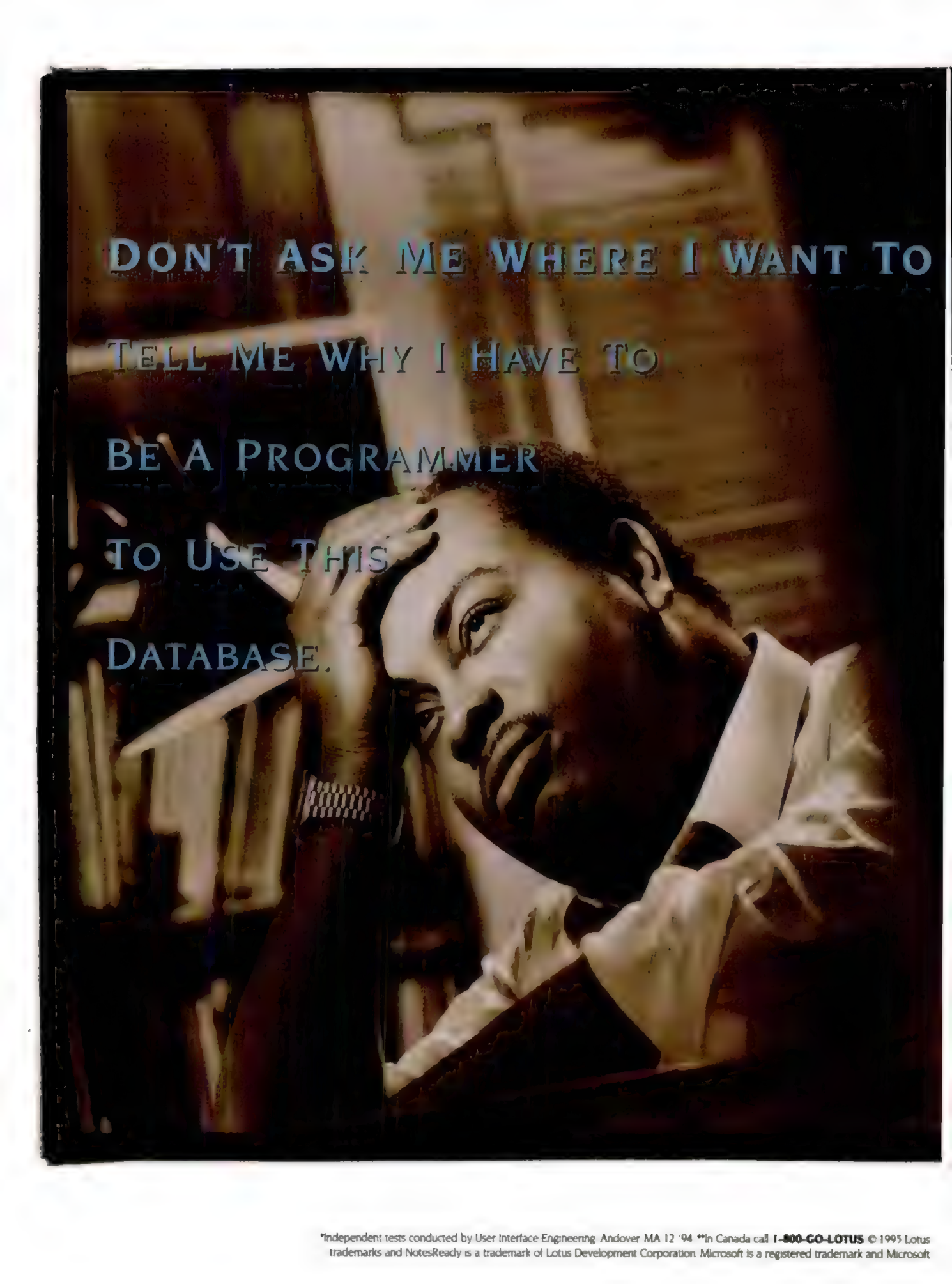
Four Palms sets itself apart from other video libraries with its search capability and the History screen, which records the entire search process. This not only allowed us to reuse search criteria but enabled us to quickly retrace our steps and backtrack to previously viewed videos. The program also lets you place bookmarks or annotate clips with your own comments.

In both approach and execution, the Four Palms collections are a welcome advance in the state of video clip art.

► Royalty Free Digital Video.

List price: \$99 per library; \$299 for all five libraries. Requires: 4MB RAM, 2MB hard disk space, MPC II specifications, Microsoft Windows 3.1 or later. Four Palms Inc., Vienna, VA; 800-747-2567, 703-759-7200 fax, 703-759-9473.

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■ Presentation Software

Presentations 3.0 Transforms Itself from Ugly Duckling to Swan

BY DAVID HASKIN

Presentations, which was once a clumsy, hard to use presentations graphics program, has been transformed from the ugly duckling of the software world into a graceful, elegant swan. Novell has not only cleaned up the \$395 program's often-messy interface, it has also focused on fine-tuning a presentation's pitch.

Presentations' new Show Expert, like Microsoft PowerPoint's Wizards, walks you through the presentation creation process. However, Show Expert adds a useful twist: It creates sample presentations based on your goals and audience rather than content.

For example, using a series of tabbed dialog boxes, we were prompted to decide whether we wanted our presentation to inform, persuade, teach, or present an award. There are also choices geared toward the audience's anticipated mood: friendly, neutral, or skeptical.

Presentations now shares the same well-designed interface as other Novell PerfectOffice suite members (First Looks, February 21, 1995). Gone are several of the glaring shortcomings that were in the previous version, such as the inability to edit text directly in a slide or to change the order of slides in the outline.

The previous version stood out for its impressive graphics tools, which included the ability to convert between vector and bitmap images. Version 3.0 adds 14 special effects filters, such as blurs, as well as simple dialog boxes for quickly adding warping and 3-D effects.

Presentations' charting capabilities include 66 chart types, many of which you can display in either two or three dimensions. Presentations uses a simple slider bar for changing 3-D chart perspective, but includes few

other chart customization tools.

The problem is that Presentations remains clumsy for creating sophisticated multimedia productions. We found it easy to add MIDI, .WAV, or audio CD clips from a single, simple dialog box, but we couldn't automatically use a single musical piece for an entire presentation. Instead, we had to add the same clip to each slide separately, which is time-consuming and annoying because the music

has to be restarted at the beginning of each slide.

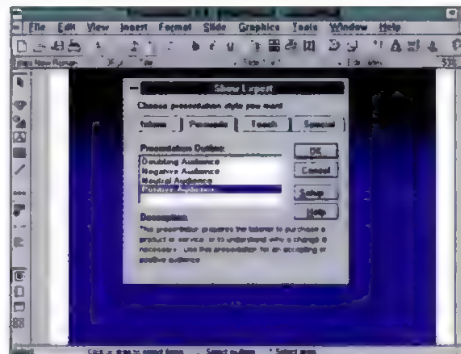
Video and animations are treated as OLE objects, which makes it difficult to coordinate them precisely with other on-

screen elements. However, Presentations can now serve both as an OLE 2.0 client and server, which does make it easier to share other types of information with OLE 2.0-compliant applications.

If you need strong drawing capabilities, OLE 2.0 connectivity, and an orientation towards meeting goals, Presentations will make your point.

► **Presentations, Version 3.0.** List price: \$395; upgrade price, \$99. Requires: 6MB RAM, 14MB hard disk space, Microsoft Windows 3.1 or later. Novell, Orem, UT; 800-451-5151, 801-225-5000; fax, 801-222-5077.

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THE PITCH: Show Expert helps create a presentation based on your goals and audience.

■ Pointing Devices

Control Your Cursor from Across the Room

BY SHERYL CANTER

Projection computer screens have been a boon for presenters, but until recently you either had to be quick on your feet or have an assistant operate the computer. Wireless remote pointing devices change all that. Using infrared technology, the RemotePoint 1.01 (\$199), from Interlink Electronics, lets you control the Windows pointer from up to 40 feet away.

The device, which is available for both PCs and Macintoshes, uses an infrared sensor that plugs into a serial or mouse port. A thumb-operated, pressure-sensitive rubber disk, which Interlink calls the VersaPoint cursor controller, is used to move the cursor on the screen.

A lip beneath the pointing device provides a place to hook your index finger, making the RemotePoint comfortable to hold for long periods. The left mouse button on the edge of

the lip provides easy clicking—much like pressing the trigger of a gun. The bar-shaped right mouse button is beneath the rubber disk and can be operated with your thumb.

The biggest drawback of the RemotePoint is that it shares the driver used by the mouse. You can use a mouse and the RemotePoint simultaneously, but the settings for one will always be inconvenient: Either the mouse will be agonizingly slow, or the remote mouse will be uncontrollably quick. RemotePoint's competitor, the Mind Path Remote Control (see the First Look review, in the September 13, 1994 issue), solves this problem by providing a separate driver for its infrared remote-control unit. The RemotePoint is also a step behind the Mind Path Remote Control because the RemotePoint lacks the handy left and right arrow keys and the special-effects software that are

included with the Mind Path product.

In the RemotePoint's favor is its ability to plug into the mouse port (the Mind Path Remote Control can use only the serial port) and the superior design of its pointing device, which offers 360-degree control.

► **RemotePoint, Version 1.01.** List price: \$199. Requires: Serial or PS/2 port. Interlink Electronics, Camarillo, CA; 805-484-1331; fax, 805-484-8989.

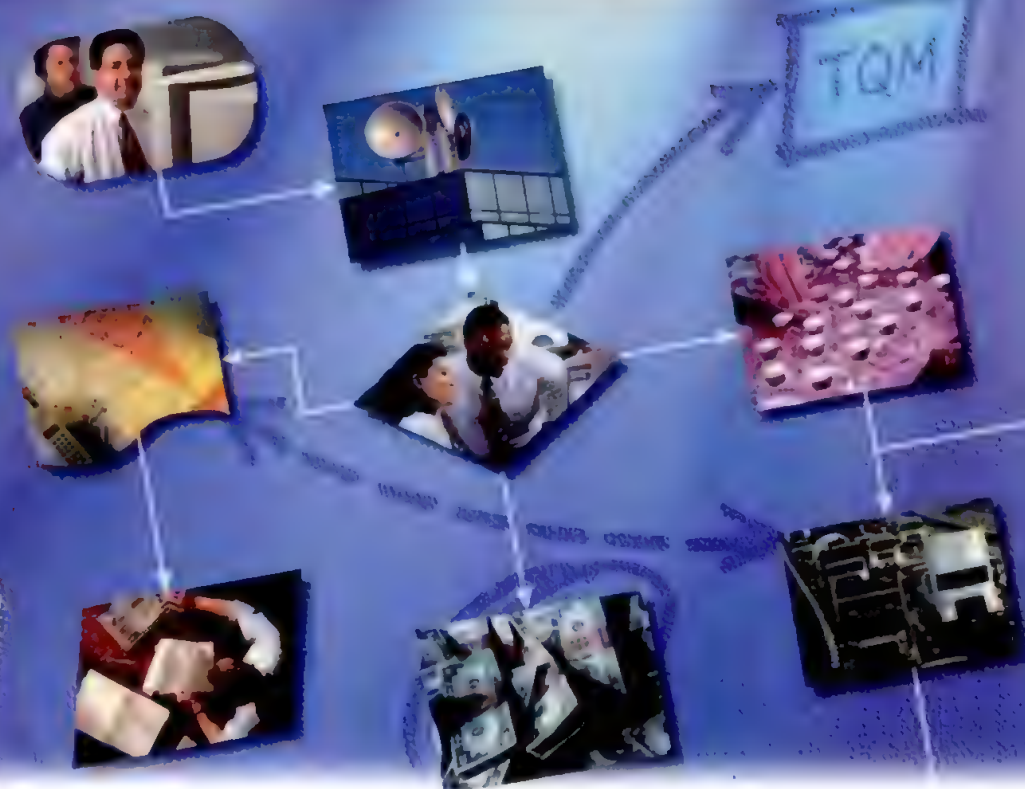
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POINT-N-CLICK: The RemotePoint's infrared transmitter lets you control a PC from up to 40 feet away.

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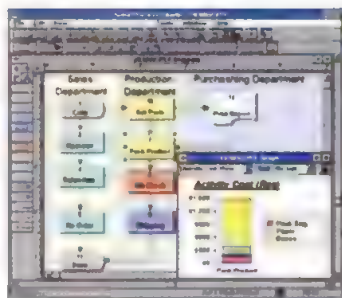
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Travel

Take Off with OAG FlightDisk

BY BARRY SIMON

The Official Airline Guides, that frequent-flier's bible known as OAG, has been transformed into an indispensable Windows program, OAG FlightDisk, North American Edition. At a cost of \$216, FlightDisk is a hassle-free way to schedule trips from your PC.

The program's interface stands out for its ease of use and ability to create and save itineraries. Once you've picked your departure and arrival cities and travel dates, a list of possible flights pops up. The dialog box is tabbed to allow quick shifting from one flight to the next, which is useful when you're planning multistop trips.

At the same time, you can also make hotel and car-rental arrangements with FlightDisk, but you'll have to enter that information manually. FlightDisk includes 800 and local telephone numbers for airlines as well as for major hotel and car-rental chains. On the downside, you cannot find in-flight meal information or

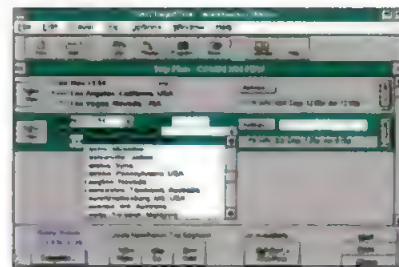
trace all of the segments of a flight with FlightDisk.

When you're finished, you can save a complete itinerary to disk, print it, e-mail it via any MAPI-enabled mail program, or fax it to your travel agent. And because airline pricing is so volatile, FlightDisk is supported by a supplementary dial-in service that will update your itinerary for \$2 per call. Worldwide and European editions are also available.

FlightDisk is a one-of-a-kind program that lets the busy traveler better plan an itinerary, even if that entails some last-minute shuffling of flights.

► **OAG FlightDisk, North American Edition.**

List price: With 12 updates, \$216. Requires: 4MB RAM, 3MB hard disk space, Microsoft Windows 3.1 or later. Reed Travel Group, Oak



PICK-'N'-FLY: Just choose the cities you want to fly from and to, and OAG FlightDisk does the rest.

Brook, IL; 800-342-56247, 708-574-6000; fax, 708-574-6667.

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Charting

Business Graphics as Easy as ABC with SnapGraphics

BY DAVID HASKIN

When it comes to business graphics programs, Micrografx's ABC SnapGraphics 2.0 (\$49.95) proves that less can be just enough. SnapGraphics makes it easy for even the most artistically challenged to create professional-looking charts and illustrations.

You start by selecting the



PLUCK-AND-DROP: Create charts by dragging shapes and dropping them on the grid.

type of drawing you want to create. SnapGraphics then loads the appropriate grid and palette of shapes. Next, simply drag a shape from the palette to the grid, connect and format the shapes, add text, and voilà! The tutorial-like SnapSteps walks the first-time user through the process.

Like Shapeware's Visio, SnapGraphics seamlessly integrates into Microsoft Word for Windows and Excel via OLE 2.0's edit-in-place capabilities (by adding a toolbar button to those applications). If you choose, SnapGraphics' toolbars and menus can even replace those of Word or Excel, so you can create graphics without ever leaving those applications.

An important feature for corporate users is SnapGraphics' ability to create and print multiple-page charts, which Visio can't accomplish. But where Visio can create a new shape simply by combining two existing shapes or rotating shapes around an axis, SnapGraphics can't. If ease of use is the top priority, SnapGraphics is your program.

► **ABC SnapGraphics, Version 2.0.** List price: \$49.99 until March 31, 1995; \$99.99, thereafter. Requires: 2MB RAM (4MB recommended), 8MB hard disk space, Microsoft Windows 3.1 or later. Micrografx Inc., Richardson, TX; 800-676-3110, 214-234-1769; fax, 214-994-6475.

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Audio

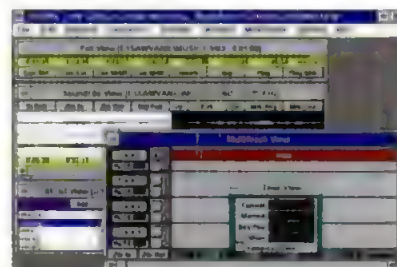
Software Audio Workshop (SAW): Cutting-Edge Sound Editing

BY MARK BROWNSTEIN

Software Audio Workshop (SAW), which is capable of producing professional results, can turn an average audio-equipped PC into a recording studio. The \$599 SAW package allows you to mix multiple audio tracks.

SAW includes features designed for professional sound editors, such as SMPTE time code, which synchronizes a sound clip to a specific frame of video or motion-picture film. The program can sample at rates up to 48 kHz, which falls short of Sound Forge's 60-kHz sampling rate.

We were able to overlay vocals from track 2 on top of music contained in track 1, while leaving the original sound files unchanged. Easy-to-use controls



DIGITAL RACK: Software Audio Workshop mimics the look and feel of professional digital audio equipment.

let you adjust the volume of any segment and deliver clean, professional-sounding recordings.

The optional \$349 Utilities Rack #1 delivers a range of special effects that make the program an audio workhorse.

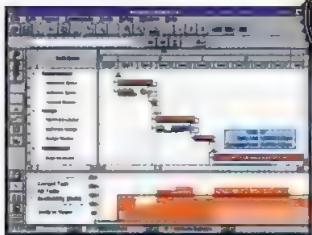
► **Software Audio Workshop.** List price: \$599. Requires: 8MB RAM, 1MB hard disk space, Microsoft Windows 3.1 or later, sound card. Innovative Quality Software, Las Vegas, NV; 702-435-9077; fax, 702-435-9106.

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*Source: 1994 J.D. Power and Associates Desktop PC Customer Satisfaction Study.™ Study conducted among business users and based on 1,528 user respondents.
**Feature included with some models. All HP Vectra PCs come with MS-DOS® 6.2 and MS Windows for Workgroups 3.11 pre-installed; HP mouse and keyboard included.
†U.S. list price, dealer prices may vary. Monitor not included. †Other capacities available. †First year on-site, 24-hour service. Second and third year return to dealer.
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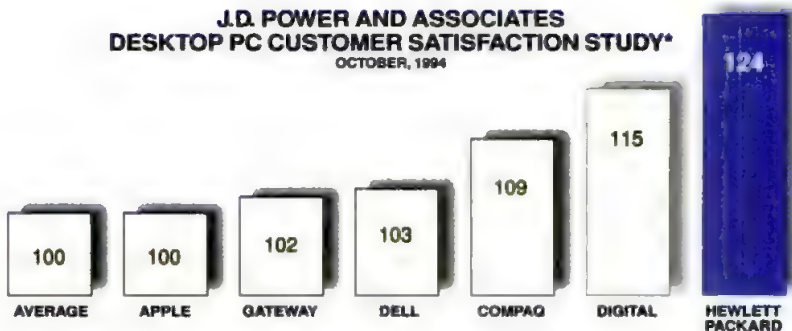
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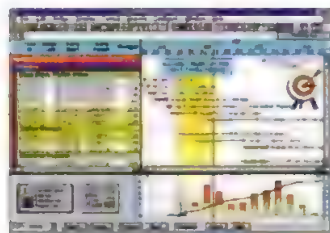
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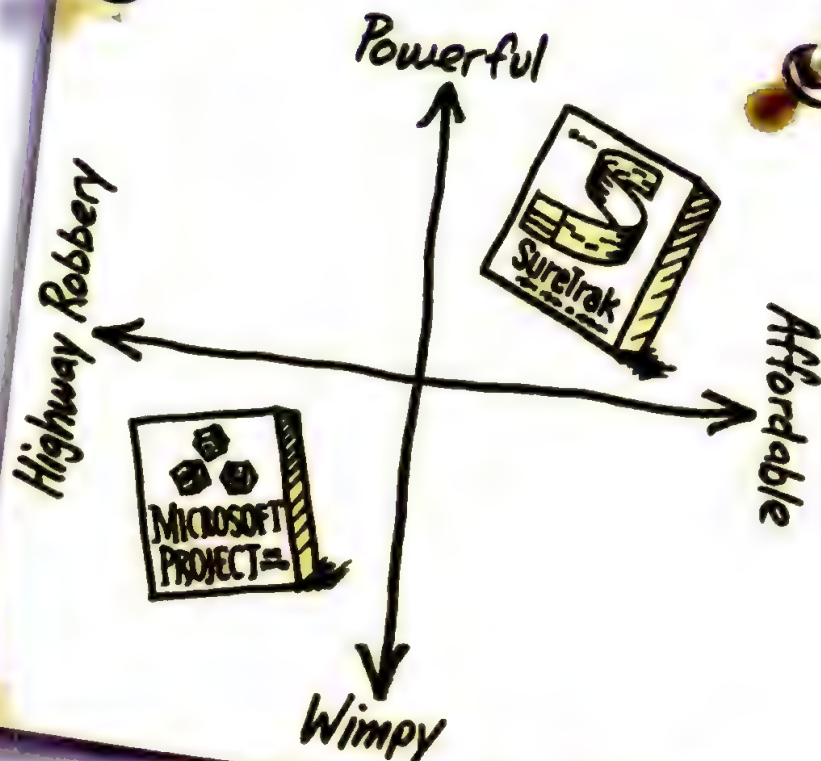
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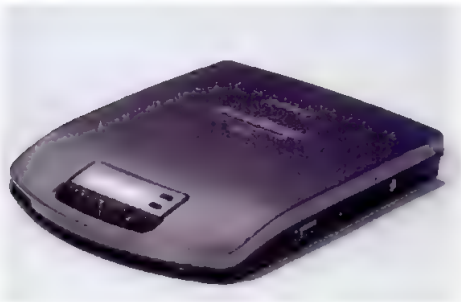
By Asa Somers

NEW

CD-ROM Discman: Portable Audio On Two AA Batteries

With a design similar to that of the Discman, **Sony's** popular audio CD player, the soon-to-be-available CD-ROM Discman weighs less than 10 ounces and runs on two AA batteries. It comes in four configurations. The \$379.95 PRD100 and \$549.95 PRD105SC connect to your notebook via the parallel port; the latter also includes a PCMCIA sound card. The \$499.95 PRD150 connects via a standard PCMCIA card, as does the \$749.95 PRD155SB, which comes with the Sony Soundbox. The Soundbox includes a sound card and speaker for a complete portable audio solution.

The double-speed CD-ROM Discman provides a sustained data-transfer rate of up to 300 KBps. Each of the four units features a headphone jack and offers ten audio playback modes, including shuffle, repeat, and 22-track programming.



FINE DESIGN: The CD-ROM Discman is 10 ounces of sleek-looking technology.

Two AA batteries will power a unit for up to 1.5 hours of continuous CD-ROM usage; the parallel-port models can run for a maximum of 6 hours of audio CD operation on a single pair of batteries, while the PCMCIA units last for about 2.5 hours. Each CD-ROM Discman comes with stereo headphones, an interface cable, an AC power adapter, and installation software.

► **CD-ROM Discman.** List price: PRD100, \$379.95; PRD150, \$499.95; PRD105SC, \$549.95; PRD155SB, \$749.95. Sony Electronics Corp., General Audio Division; Park Ridge, NJ; 800-766-9236.

Circle 411 on reader service card

HOT PROSPECT



Pentax PocketJet: The 1-Pound Ultra-Portable Printer

Designed with ultimate portability in mind, the Pentax PocketJet thermal printer, now shipping from **Pentax Technologies Corp.**, has a travel weight of only 17.5 ounces. The PocketJet comes with a nickel cadmium battery, which delivers from 30 to 35 pages of printing on a single charge; a full recharge takes only about 70 minutes.

The PocketJet works without toner or ink cartridges; instead, it uses heat to activate a dye in special thermal paper supplied by Pentax. The paper is expensive (nearly 8 cents per page), but there are no ribbons or ink cartridges to replace. The special paper isn't nearly as shiny or featherweight as old-fashioned roll fax paper, but it isn't 80-pound bond either. In most on-the-road situations, the paper will be perfectly acceptable.

The PocketJet prints at 300- by 300-dpi and with a maximum speed of 3 text pages per minute (hand feed only). It features full LaserJet IIP emulation, including seven internal HP fonts, and the ability to download additional fonts and graphics. Pentax ships each printer with a battery (\$37.99 for each additional unit), AC adapter, parallel interface cable, printer carrying case, and 100-sheet box of thermal paper. An RS-232C serial interface cable is available as a \$25.99 option.

► **Pentax PocketJet.** List price: \$499. Pentax Technologies Corp., Broomfield, CO; 800-543-6144; fax, 303-460-1628.

Circle 410 on reader service card

IMPROVED

A Universal Mailbox for All Kinds Of Electronic Mail

ConnectSoft recently announced Version 3.0 of E-Mail Connection, an electronic mailbox that provides users with direct send/receive links to the Internet, commercial on-line services (including America Online, CompuServe, MCI Mail, and Prodigy), and local company-wide e-mail systems, such as cc:Mail and Microsoft Mail. E-Mail Connection 3.0 now has a spell-checker, tab-style address book, and direct support for RadioMail, as well as two modes of operation: Easy and Advanced. Easy mode reduces your options to sending, receiving, replying to, and forwarding messages; Advanced mode offers message filtering, support for attachments, and hierarchical folders for message management.

► **E-Mail Connection, Version 3.0.** List price: \$49.95 (upgrade from Version 2.0, \$24.95); ConnectSoft Inc., 800-889-3499, 206-827-6467; fax, 206-822-9095.

Circle 412 on reader service card

NEW

NEC's MultiSync XV15 Fills the Entry-Level Monitor Gap

NEC Technologies released the MultiSync X series of monitors last fall, targeted at business users and graphics professionals. To satisfy first-time computer owners and SOHO (small office/home office) users, the company has recently introduced the NEC MultiSync XV15, a 15-inch unit that contains the same flat-square CRT as its higher-priced brethren.

The MultiSync XV15 supports the Plug and Play standard and has a 0.28-mm dot pitch, Invar shadow mask, and maximum resolution of 1,280-by-1,024 at a refresh rate of 60 Hz. The unit has a full array of user controls located up front for easy access. Like all the MultiSync X



SWEET FIFTEEN: The MultiSync XV15 fills the SOHO bill.

New & Improved

monitors, the MultiSync XV15 is Energy Star- and MPR II-compliant. NEC has also introduced the AudioTower speaker system (street price, under \$100)—two 11.2-inch-tall stereo speakers with 8 watts of power each—for SOHO multimedia use.

► **NEC MultiSync XV15.** Estimated street price: \$455. NEC Technologies, Wood Dale, IL; 800-632-4636, 708-860-9500.

Circle 413 on reader service card

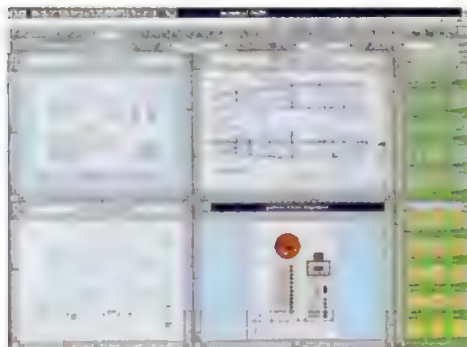
NEW

Get Technical with the Latest Visio Drawing Package

Business users who need technical drawings but don't want to deal with the ins and outs of a complicated CAD program may want to turn to Visio Technical, Version 3.0, from **Shapeware Corp.** The product shares the version number of its parent, Visio 3.0, although it adds new libraries and functionality.

This latest member of the Visio drag-and-drop drawing clan (Visio Home 3.0 was covered in First Looks, January 24, 1995) includes 1,500 SmartShapes—intelligent clip art for engineering, home design, and network- and software-diagramming applications. SmartShapes automatically retain their proper proportions whenever you size them. The product also includes intelligent connectors, which remain linked to objects even if the objects move.

Shapeware has engineered Visio Technical



INTELLIGENT CLIP ART: Visio Technical includes 1,500 SmartShapes for technical applications.

to read AutoCAD .DWG files and convert them into native drawings. Version 3.0 supports OLE automation, letting you customize the program to meet your specific needs. Drag-and-drop dimensioning, page layering, and support for Lotus Notes and Microsoft Mail are also built-in.

► **Visio Technical, Version 3.0.** List price: \$349. Shapeware Corp., Seattle, WA; 206-521-4500; fax, 206-521-4501.

Circle 415 on reader service card

BRIEFS

Software

Enhanced Mosaic, the commercial version of the NCSA's shareware World-Wide Web browser, will soon be available in Version 2.0 from **Spyglass**. This new release will feature a security framework for conducting business transactions over the Internet; the Mosaic Software Development Interface (SDI), which provides links to electronic document software such as Adobe's Acrobat; and Advanced Display Technology (ADT), which makes the program feel faster on the user's desktop. Look for Enhanced Mosaic to be bundled with full-fledged Internet and communications software packages. 708-505-1010; fax, 708-505-4944.

FaxQuest has announced Robofax PRO Single-Line (SL), a high-end fax-on-demand package priced at less than \$1,000. Robofax SL offers network compatibility and password protection for sensitive documents. You can easily upgrade to multiple lines as your business grows. Robofax SL is Group 3-compatible and runs at 9,600 bps. The Robofax SL software and a single voice/fax board list for \$795, including a microphone and speaker. Additional voice/fax boards are \$200 each. 800-995-9141, 408-736-1487.

Home Manager, from **BLOCS Software**, is a group of over 50 easy-to-use, family-oriented applications for organizing and consolidating household records and documents. All the applications in Home Manager are integrated and have a similar look and feel; included are programs for financial organization, scheduling, filing recipes, keeping track of medical information, listing addresses and phone numbers, and cataloging the family's books or video cassettes. Home Manager's Workshop function allows you to develop your own applications for specific needs. The Windows version of the product is \$70, the DOS version is \$60. 800-836-0047.

For high-tech engineers and researchers who need comprehensive international patent information, **MicroPatent** has introduced World Patent Alert (WPA) electronic newsletter.

NEW

When Your Computer Becomes a Conference Room

Target Technologies has introduced C-Phone, a PC-based teleconferencing hardware/software package that, according to the company, provides full-motion 30-frame-per-second video across an existing Ethernet network. C-Phone uses *broadband* technology to broadcast video information at a higher frequency than standard Ethernet transmissions; this allows for teleconferencing without affecting your network's throughput.

The system hardware consists of a single camera/speaker/microphone (CSM) that clips to the top of each user's monitor, and only one expansion slot is used in each PC site. C-Phone provides 15-fps video over ISDN lines, and the system is H.320-compatible.

Target Technologies has also released the \$3,995 C-Phone Multi-point Controller, which enables you to see and communicate simultaneously with other users on the network in up to four on-screen windows.

► **C-Phone.** List price: \$1,995 per user. Target Technologies, Wilmington, NC; 800-666-2496, 910-395-6100; fax, 910-395-6108.

Circle 416 on reader service card



SMILE! C-Phone's CSM delivers 30-fps video from atop your monitor.

NEW

Manage AS/400 Files with Point-And-Click Ease

Information Technology Solutions has recently introduced 400/Manager, a Microsoft Windows-based database manager for IBM's AS/400 minicomputer. The software resides entirely on a PC-based LAN and requires no change to an existing AS/400. Users of 400/Manager can browse, search, and sort data in one or multiple files via drag-and-drop functionality. 400/Manager lets you copy data into any Windows application on the fly and generate reports without additional programming.

► **400/Manager.** List price: \$995 per user (discounts available for multiple licenses). Information Technology Solutions Inc., New Orleans, LA; 504-539-9300; fax, 504-539-9304.

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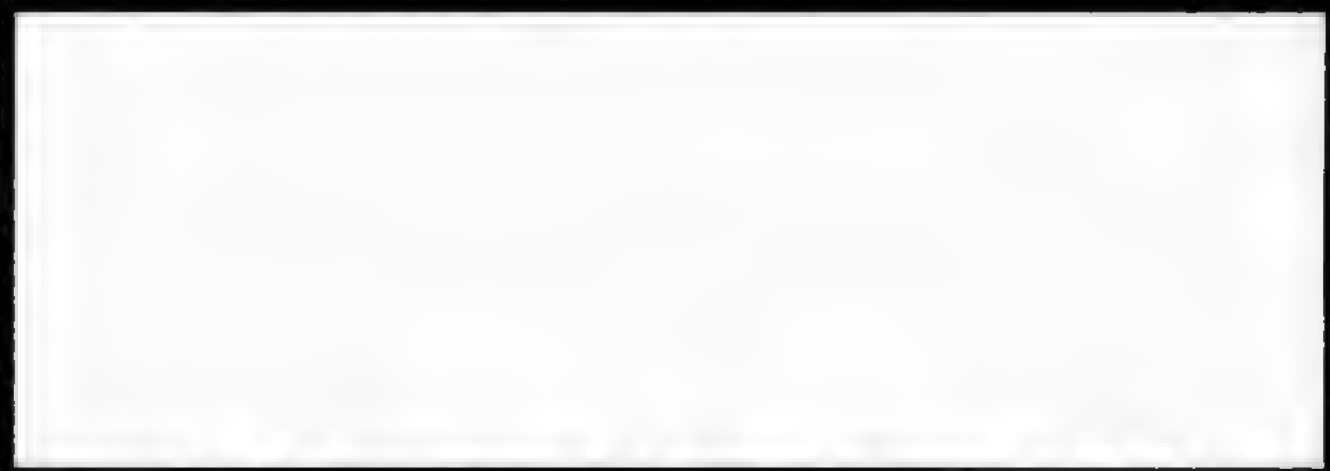
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New & Improved

NEW

Rev-To-SMP: Symmetric Multiprocessing Made Easy

With the new breed of multithreaded operating systems on the horizon, the benefits of multiprocessing are becoming more tangible. **Evergreen Technologies** has introduced the Rev To SMP upgrade system, which turns your 486-based desktop machine into a dual-processor workstation. The unit plugs into any 168-pin 486-compatible CPU socket and



TWICE AS NICE: 15 minutes is all it takes to upgrade to a dual-processor machine.

provides bays for two chips running at multiples of your original CPU's clock speed; the total installation takes about 15 minutes. You can even use your original chip as one of the two new processors. The Rev To SMP system provides up to 256K of zero-wait-state L2 cache for each of the two processors and will automatically run in single-processor mode when you are using Windows or another nonmultithreaded OS.

► **Rev To SMP.** List price: \$499 (CPUs not included). Evergreen Technologies Inc., Corvallis, OR; 503-757-0934; fax, 503-757-7350.

Circle 417 on reader service card

NEW

Novapak Does Cellular Communications in a Single Card

NovaPak is a Type II PCMCIA device from **NovaLink Technologies** that combines the functions of a voice modem and an alphanumeric pager in a single card. Unlike its lower-priced sibling, NovaModem 144 (First Looks, December 6, 1994), NovaPak allows for full cellular communications and two-way paging. The device can be used as a 4-ounce standalone pager; its LCD window displays pages, and you can scroll through longer messages. NovaPak includes a 14.4-Kbps modem with error-correction and data-compression algorithms and comes with all necessary software for communications via standard and cellular phone connections. The card comes with either 32K or 128K of message memory and features dynamic memory allocation to prevent users from running out of space.

► **NovaPak.** List price: \$449. NovaLink Technologies Inc., Fremont, CA; 800-668-2546, 510-249-9777; fax, 510-249-9666.

Circle 418 on reader service card

BRIEFS

Software

ters. The WPA newsletters provide keyword- and Boolean-searchable information on U.S., European, and worldwide patents in 32 high-technology fields. The newsletters are distributed monthly on floppy disk or can be downloaded from the Internet, and cost \$295 per year for the first newsletter and \$150 per year for each additional one. 800-648-6787

DesignWare has released myHouse for Windows, Version 1.5, an \$84.95 home-design and -visualization software package for architectural hobbyists. The new version includes the Dreamscape feature, which lets you place your virtual house in a number of different exotic landscapes provided on-disk; you can also merge your home into a photograph you take of a specific location. Version 1.5 also comes with QuickHouse, a collection of pre-designed floor plans that can change size depending on measurements you input. The Movie Maker feature lets you design animated 3-D walk-throughs of your finished design. 617-924-6712; fax, 617-924-1699.

Hardware

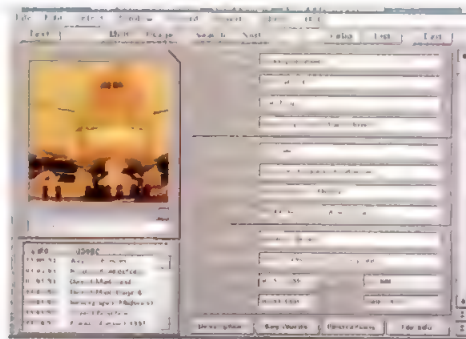
QMS has introduced the new QMS magicolor Plus color laser printer, which offers 600- by 600-dpi color printing on plain paper. The magicolor Plus churns out between 3 and 6 pages per minute in color and up to 12 pages per minute in black-and-white. The included QColor drivers provide both basic and advanced color-matching and -customization capabilities. The magicolor Plus is fully networkable and comes in an \$8,999 configuration with 12MB of RAM and a \$9,999 configuration with 24MB of RAM. 800-523-2696, 205-633-4300.

In August 1994, the **Tatung Company of America** introduced the 15-inch Audio 15 multimedia monitor, which included built-in stereo speakers. Recently, Tatung followed with the introduction of the \$420 14-inch Audio 14 and \$850 17-inch Audio 17 units. Both new units feature two internal 1-watt stereo speakers; while the 14-inch monitor is capable of 1,024-by-768

NEW

Manage Image Files Without Clogging Your Network

Whether you publish a widely distributed magazine or a company newsletter, managing the behemoth image files that serve as your artwork can be a major hassle. CompassPoint, a "visual database" from **Northpoint Software**, can handle up to 100,000 scanned images and manage their use across any Windows-compatible network. To reduce network activity caused by transferring huge image files, CompassPoint disseminates compressed "thumbnail" images to users for browsing. Fifteen searchable fields travel with each thumbnail, providing users with such pertinent information as the image's category, subject, and date of creation. The fields are customizable: Two additional description fields hold up to 16 pages of information. CompassPoint contains its own security system (which can restrict access to certain sensitive files), a usage history for each image, and a check-out system to keep track of physical images such as prints and slides.



HAVE IT YOUR WAY: CompassPoint's 15 searchable fields are customizable.

► **CompassPoint.** List price: \$995. Northpoint Software, Berkley, MI; 810-543-1770; fax, 810-541-1858.

Circle 420 on reader service card

NEW

PentaCalc Pro Adds Up

For mathematical calculations both simple and complex, **Headgate** has created PentaCalc Pro—a fully customizable calculator package based on the company's low-priced PentaCalc. Each calculation you perform is recorded on PentaCalc Pro's tape display, which will recalculate your figures automatically. You can retrace your steps and make modifications within a series of calculations to play out various scenarios. For example, you can figure mul-

Alexandre Patty had a rather distinctive approach to descending a staircase. Since he obviously preferred doing things the hard way, he probably wouldn't have been interested in faxing with Delrina WinFax PRO.



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multiple mortgage-payment schedules for different interest rates and periods of time.

PentaCalc Pro's on-screen calculators are user-configurable; you can add any of the program's predefined function buttons or create your own buttons to perform specific calculations. The software will import calculations from other Windows-based applications and paste results back into the original app. The program's Smart Units feature allows you to perform calculations using a variety of units and get your answer in a single equivalent unit; multiplying pounds by meters divided by seconds squared yields a result in newtons.

► **PentaCalc Pro.** List price: \$49.95 (upgrade from PentaCalc, \$29.95). Headgate Inc., Bountiful, UT; 800-230-0652, 801-298-3800; fax, 801-298-9169.

Circle 419 on reader service card

NEW

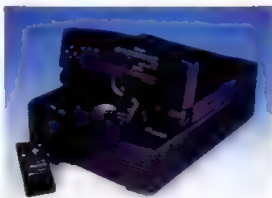
Polaroid Broadens Its Family of Computer Presentation Devices

Polaroid Corp. has introduced a line of LCD projectors and a high-resolution LCD panel for business users who need to give computer-aided presentations.

The passive-matrix PolaView 45 and active-matrix PolaView 75 LCD projectors are designed for text-only presentations. The PolaView 75 supports 2 million colors and handles video presentations via an optional adapter. The active-matrix PolaView 85 is a full-featured projector with integrated audio and video for multimedia presentations and an ultrabright tungsten halogen lamp designed to work in most lighting situations. Each PolaView LCD projector comes with a programmable wireless remote control. Polaroid's top-of-the-line PolaView HR 2500 LCD panel projects images at 1,024-by-768 resolution and provides full-color support. The HR 2500 is designed for use with applications that require fine-line imaging, such as CAD and engineering packages.

► **Polaroid PolaView 45.** List price: \$4,995. **Polaroid PolaView 75.** List price: \$7,995. **Polaroid PolaView 85.** List price: \$8,995. **Polaroid PolaView HR 2500.** List price: \$12,995. Polaroid Corp., Cambridge, MA; 800-816-2611, ext. 970.

Circle 421 on reader service card



TEXT CASE: The PolaView 75 does text-only presentations in 2 million colors.

BRIEFS

Hardware

resolution at a 60-Hz refresh rate, the Audio 17 manages 1,280-by-1,024 at 60 Hz. The 17-inch unit has a Hitachi flat-square screen with a 0.28-mm dot pitch. It is Plug and Play-compatible and meets Energy Star and MPR II guidelines. 800-829-2850, 310-637-2105.

The **Panasonic Communications & Systems Co.** has introduced the FX-RS308C, a color scanner that comes with PanaScan Plus scanning software and Twain driver, Aldus PhotoStyler 2.0., and an 8-bit SCSI card. The FX-RS308C is a single-pass scanner that offers 300-by-600-dpi resolution and 24-bit color output (16.7 million colors and 256 levels of gray). It lists for \$1,175. 800-742-8086, 201-348-7000.

For multimedia on the road, check out **Axonix Corp.**'s ProMedia Player, a two-piece portable device that includes 16-bit play/recorder audio capabilities, a 4-watt stereo sound system, and a dual-speed CD-ROM player. The \$499 unit is Sound Blaster-compatible and plugs into a standard Type II PCMCIA slot. It comes with external stereo speakers, mic, stereo line in, headphones, and external microphone jacks. 800-833-9797.

Epson America has broadened its line of portables with the ActionNote 800 family of multimedia-ready notebooks. Each unit features either a 10.3-inch passive-matrix or 10.4-inch active-matrix color screen and a trackpad pointing device. Each ActionNote 800 comes with a 486DX2/66 or DX2/80 CPU and write-back cache, two Type II PCMCIA slots, and a full array of peripheral ports. A 16-bit audio card is optional. Prices start at \$2,499. 800-374-7300

And Finally...

Hewlett-Packard has reduced the prices of its DeskJet 1200C and 1200C/PS color printers by more than 25 percent. . . **3M** has released a free brochure entitled "Understanding Color" to provide an understanding of fundamental color principles. Call 800-328-1684, ext. 350 to order a copy. . . **Pinnacle Micro** has reduced the price of its Recordable CD Backup System by more than \$1,000.

NEW

Build Software from Modules and Granules

Avista Software's new namesake business-management package is a cross-platform client/server solution for DOS, OS/2, and Unix. It is tailored to specific companies' needs via the addition of modules and their subsets, called *granules*. There are 11 modules and 36 granules to choose from. Avista contains the TrendScope feature, which analyzes data by user-selectable time periods, and AvistaFields and AvistaFilters, which let you dissect data to gain additional perspective. The package supports multiple languages and currencies, and the ApplicationCrafter gives the systems administrator the ability to change fields and create new windows. ScreenCrafter gives end users on-line screen customization capabilities.

► **Avista.** List price: Basic ledger system, \$700; additional granules, \$200 to \$2,000 each, depending on configuration. Avista Software, Norcross, GA; 404-564-8000; fax, 404-564-8010.

Circle 422 on reader service card

NEW

Software Demos the Easy Way With DemoShield

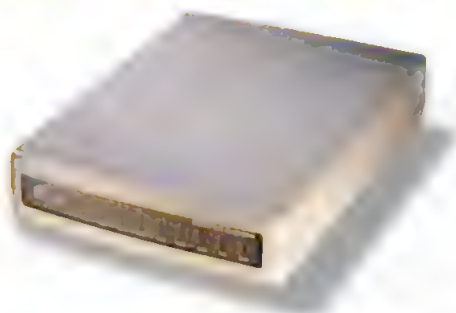
Software developers wishing to create interactive demos or tutorials for their applications should investigate DemoShield, from **Stirling Technologies**. The package allows you to drag and drop objects into scenes and then link scenes into a complete presentation; best of all, the package requires no programming.

DemoShield's built-in macro recorder allows you to create demos in which the viewer interacts with a live application. DemoShield comes with a number of built-in example demos and a Setup Wizard to help you create a distribution disk that will install and play a demo on the viewer's system. Viewers can set the pace of the demo to suit their needs, and VCR-like controls allow viewers to navigate to specific sections. You can place buttons, hot spots, and checkboxes in your demo to make it fully interactive, and you can animate objects with effects such as Grow from Center and Disappear. The package comes with an unlimited royalty-free license for developing and distributing demos.

► **DemoShield.** List price: \$495.00. Stirling Technologies Inc., Schaumburg, IL; 800-374-4353, 708-240-9111; fax, 708-240-9120.

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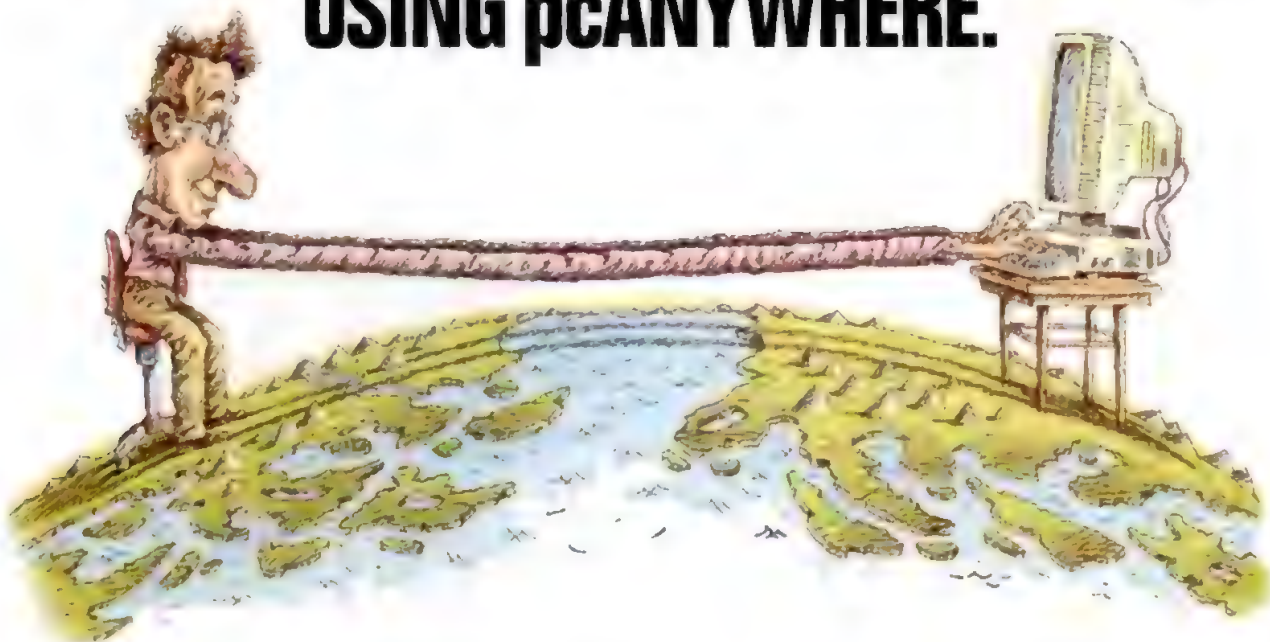
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REVIEWS OF THE LATEST BOOKS FOR THE PC USER

Edited by Tin Albano

When Reality Isn't Real Enough

BY LANCE N. ULANOFF

Hyperbole swirls around virtual reality (VR) like so much sand in a windstorm. But there's a way to be one step ahead of the hype, as well as your peers. From the landslide of literature being written about VR, a number of useful, informative, and—dare we say—realistic tomes have emerged.

Probably the best entry-level book among those we looked at is *Virtual Reality Now* by Larry Stevens. It is informative yet manageable, with short, almost bite-size chapters covering everything from VR in history and fiction to creating your own virtual worlds.

There aren't a lot of photos or illustrations in Stevens's book, but you won't really notice, because the text is broken up by so many section headings. This book is really best used as a browser. You can flip back and forth through the pages and find references to the connection between artificial intelligence and VR ("While VR tries to take fantasy and computer graphics, and expand them so that they replace reality, AI tries to take something that's real and make it artificial"). The book comes with VistaPro (a DOS-based 3-D landscape builder), and a demo of the VR toolkit WorldToolkit for Windows from Sense8.

Stevens's book does suffer from some weird typos and a couple of lapses in editorial judgment. One wonders why Stevens's editor didn't remove

the passage that describes people's irritation with head-mounted displays (HMDs) that mess up their hair. Oversights aside, Stevens's book makes a good companion to a more technically intensive VR book, of which several are available today.

Among these is Linda Jacobson's *Garage Virtual Reality: The Affordable Way to Explore Virtual Worlds*. Anyone who bought a Heath kit in the 1970s and wiled away the hours tinkering and creating electronic gizmos should love this book. Included are instructions on how to build your own HMD, as well as dozens of photos and informative schematics on how VR technology works. There's also a basic PC-history lesson, a history of garage-based VR, and information on where to order VR equipment.

Jacobson is incredibly thorough. She includes an extensive glossary and a directory for VR information available on the Internet; the VR optics section mentions just about every device imaginable, including the esoteric



Improvements to image-editing software—namely increased ease-of-use coupled with more powerful imaging tools—have led to a growth in the number of image editors. If you want to join their ranks, check out *Outrageous PC F/X* by David D. Busch. The book covers the most popular image-editing programs and is tailored specifically for imaging amateurs and hobbyists. \$34.95, MIS Press, 800-628-9658; ISBN: 1-55828-394-3.

■ A Sign of Our Cyber Times

It's just one of many acute observations: "The yuppies... were the first members of a new species, homo sapiens electronicus," writes Timothy Leary, the Harvard psychologist renowned for his first-person perspective on 1960s counterculture, in *Chaos & Cyber Culture* (\$19.95, Ronin Publishing, 800-858-2665). This time,



Leary examines the sociocultural implications of the technology explosion.

Interviews with such cyber-culture and Gen-X figures as actress Winona Ryder, David Byrne, and author William Gibson add depth to this lively collection, whose chapters include "Digital Activation of the Erotic Brain," and "The Cyberpunk: The Individual as Reality Pilot."

—Melissa J. Perenson

Immersion Probe. Her readers will surely be rushing to their garages to start building their own VR worlds, possibly by using the accompanying 3.5-inch disk that includes the popular demo version of VistaPro, source code for programming a data glove, and other VR sample programs. But even garage-based VR isn't cheap (the homegrown HMD requires two Sony LCD monitors): Home designers may just have to take out a small loan first.

The Virtual Reality Primer by L. Casey Larijani is aptly titled: It is a VR introduction that spends much of its time talking about VR applications in the real world, including research, chemical exploration, and military applications. Although not particular-

ly well written, it offers a bit more VR theory than the other books reviewed here, covering sizing, perspective, and "Megamen, MicroWorlds," which Larijani describes thus: "The ability of a virtual environment to block out constraints of the real world... is among its most alluring features. A tempting wish to be a 'fly on the wall' can now be granted."

Two caveats: The section on what equipment you'll need to do VR is a little spare, and the illustrations look as if they were pulled from someone's high-school yearbook.

Perusing any one of these books should help bring the virtual world into reality.

► **Virtual Reality Now**, by Larry Stevens, \$24.95; MIS Press, 800-628-9658; ISBN: 1-55828-355-2. Circle 522 on reader service card

► **Garage Virtual Reality: The Affordable Way to Explore Virtual Worlds**, by Linda Jacobson, \$29.95; SAMS Publishing, 800-428-5331; ISBN: 0-672-30270-5. Circle 523 on reader service card

► **The Virtual Reality Primer**, by L. Casey Larijani, \$24.95; McGraw-Hill, 800-822-8158; ISBN: 0-07-036416-8.

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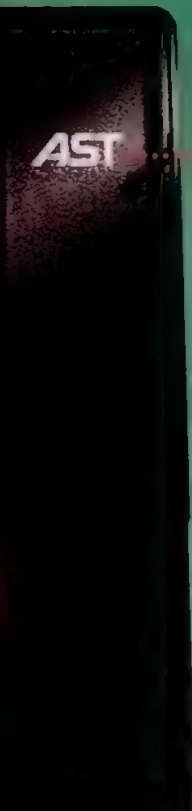
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Michael J. Miller

What You Want to See in 1995

Many of you wrote in to add your wishes to my 1995 computer wish list ("What Will We Want Next Year?", December 20, 1994). As I had expected, I received a lot of requests for more innovative and cutting-edge technologies. But after reading

many of your letters, I found that most of you just wanted your hardware and software to work together the way the products are supposed to.

Here's a typical response. Mark Ammerman writes: "I have one wish for my PC that I think should be simple enough to fulfill. One easy-to-use, fast operating system—without barriers. I'm sick to death of modifying AUTOEXEC.BAT, CONFIG.SYS, and .INI files to make things work. I just want to turn on my PC and run everything from one desktop."

MAKE MULTIMEDIA EASY

Of course, I also heard a lot from Macintosh owners pointing out how Macs make multimedia easier. And they're certainly right. Even if Macs aren't quite as easy as some of the folks at Apple say, they're still easier to use than the typical Windows or OS/2 machine.

But as I was reminded by Gary Ludwick, it's not just Macs that got multimedia right: "If Mac owners are smirking when PC editors speak of the problems of multimedia, then Amiga owners are positively rolling on the floor in laughter. Commodore may be deadlier than 1K RAM chips, but 10 years later PCs, and to a lesser degree Macs, have yet to reach the degree of multimedia sophistication exhibited by my old A-1000. . . . The laws of economics and business may require me to be PC-literate, but I've never gotten the pure enjoyment out of one that I got from my Amigas. And certainly not the hassle-free operation. Maybe that's why they were so much fun—I didn't spend my time worrying about IRQ, DMA, and BIOS settings."

A. Carter sums it up by saying: "What I want more than anything else are standards and ease of use. I'm tired of checking several

dozen different configurations before deciding whether I should buy a new product. Then I'm really, really sick of having to perform open-heart surgery on my PC just to install a new sound card. I want a dozen equal ports where I can plug anything into my PC and boot up—and everybody's happy. That way, if my CD-ROM, sound card, or whatever has a problem, I can just pop out the defective unit and pop in a new one. Variations are nice, but keep 'em all in line!"

MAKE SETUP SIMPLE

All of these people are right. Setting up hardware so it works with all your software, and vice versa, is ridiculously complicated on the PC. Particularly as the PC becomes more consumer-oriented, the era of DIP switches and IRQ settings must come to an end. We should have had plug-and-play years ago; in fact, we probably would have if IBM had succeeded in articulating the benefits of Micro Channel and licensing it for a reasonable fee. But that's water under the bridge.

What we *can* ask for 1995—and realistically hope to get—is machines, peripherals, and operating systems that fully exploit the Plug and Play standard. Just as important are applications that work out of the box on most people's systems.

Readers also wanted other advances in hardware that will make machines easier to use. Michael Rojek wants "a system that boots up in 1 or 2 seconds instead of the minute or so that it takes for all of the PCs I use to get up and running. If my present PC had the ability to start almost instantaneously, I would probably be able to make more use of my fax-receiving hardware, because I could have my PC turn on each time the phone rings. Now I



The mail I received showed that the majority of you want your computers to be easier to use.

Michael J. Miller

have to keep my PC powered up, wasting energy and money." Hmm. . . I primarily use portable computers, and I certainly enjoy these features on HP OmniBooks and Toshiba laptops. IBM and a couple of other computer manufacturers are beginning to include features on desktops that will make PCs boot up faster. Why not?

MAKE HARDWARE SOFTER

Scott Kemp wants to see "a better mechanical user interface—one that takes ergonomic concerns seriously. I think the best way to do this may be a sort of virtual keyboard—a device that uses infrared or some other wireless technology to sense the motions of my fingers (hands, feet, head) and accept it as input. For me, the hardest part of working with computers is dealing with the sore hand and wrist muscles you can get from extended use." Mr. Kemp is certainly not the only person who wants that.

A number of people want newer, smaller, more powerful portables. Robert Laubach

says his "Perfect Portable for 1995" has a Pentium/75 CPU with 16 MB of RAM, 500MB of hard disk space, a built-in 28.8-Kbps modem, an infrared port, a trackball, a 10-inch active-matrix color SVGA screen, two PCMCIA slots, and two 5-hour batteries with a built-in charger. Oh yes, and he wants it to weigh 3.5 pounds or less. I'd like to see that machine as well, but I doubt it will happen in 1995.

On the other end of the portable spectrum, Michael Jaffarian just wants an upgrade to his Tandy 102. He'd like it to be a bit smaller and lighter but still have a full-size keyboard. It should also offer improved word processing software, a better (not necessarily full-size) display, and the ability to run for 40 hours on only four AA batteries. And he wants it for under \$200. I haven't seen anything like it, but why not?

Anthony M. Biancucci wants a number of other innovations, including faster serial and parallel ports and faster RAM systems such as EDO or Rambus memory to replace expensive Level 2 caches. If not, he says he's considering Power Macs. But I think he'll see such advances.

I also found that a lot of you agreed with

my constant request for better, more integrated communications software, and I read a lot of requests for more information to be made available on the Internet.

What really surprised me was the large number of our readers who asked for computers they can talk to and that will talk back to them. The latter is certainly feasible, and we have already seen some surprisingly useful voice recognition technology that—for now—works only in fairly specific applications. This will continue to improve, of course, but I don't think general-purpose, speaker-independent voice recognition is going to emerge in the next year or two.

KEEP YOUR FINGERS CROSSED

All of these requests are just the kinds of things that we should be looking for in new hardware and software. We should expect hardware and software companies to meet our demands. We want, we need, and we have a right to expect the next level of hardware and software applications to be easier to set up and to use. And we should demand that our future operating systems clean up the configuration problems we've all experienced in the past. □

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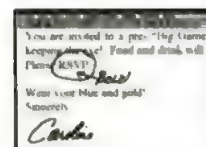
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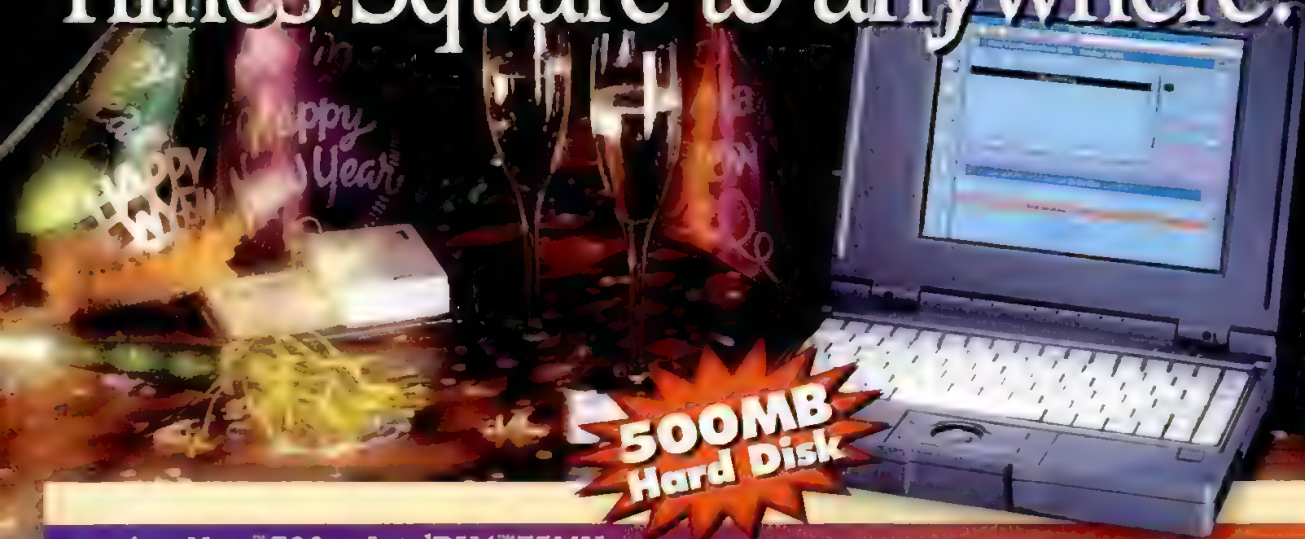


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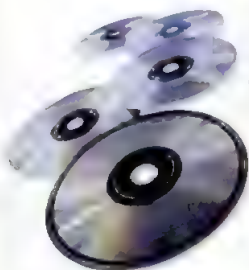
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Bill Machrone

Great Product, Terrible Name

Just what the world needs—really!—a new user interface. On January 7, Bill Gates introduced a new product at the huge Consumer Electronics Show in Las Vegas. It raised as many questions as answers. Is it a user interface or an application suite?

Is it for first-time users or can everyone benefit? Does it replace Windows? How does it tie into the Windows 95 strategy? And most importantly, why did they name it "Bob"?

That's right. If you haven't heard, Bob is a collection of home-oriented applications in an entirely new user interface. When you start Bob, you see a room filled with familiar objects. You start programs such as the checkbook, letter writer, and address book by clicking on them. Other built-in applications include home inventory and financial advice, an e-mail program, and a computer version of GeoSafari, the popular children's quiz game.

An animated guide sits in the lower-right corner and offers you advice, friendly tips, and encouragement. The default guide, Rover, is a helpful, likable pup. You can choose other guides that are more or less helpful, or that match your personality. Some of them, such as Ruby the Parrot and Scuzz the Rat, are definitely countercultural. You can build additional rooms that are usable by the entire family or private and accessible only with your password. You can bring in icons for other, non-Bob applications and put them on shelves as boxes or hang them on the walls as pictures in frames. Your home can look like a medieval castle, a contemporary cottage, or whatever suits you. There's a safe, a garage, an attic, and even a mouse hole.

Bob is nothing more than a smiley face wearing horn-rimmed glasses. He has no active role in the program.

Bob went through beta tests as "Utopia," which is a good name, but at least four companies claim title to it. The Bob name and the smiley face were the still-born brainchildren of the geniuses at Wieden and Kennedy, the same ad agency that gave you those incomprehensible Nike commercials. Their reason-

ing had something to do with friendliness and accessibility, but I just think it sounds stupid.

We've been beta-testing Utopia/Bob at home, but didn't find out about the name change until recently. My wife, kids, and I were actually discussing it over dinner one night. Please join our conversation:

Me: . . . and it does print labels. You find that out when you go to print.

Sharon: All I want is to put in names and addresses and have a field that says list one, list two, list three. Then I want to be able to print labels by calling up the list number. But if a person is on two lists, I don't want to have to enter the name twice. Can it do that?

Me: I don't know. But we do have an add-on module that makes greeting cards to try out. [I subsequently find out that it can do all Sharon asks and more.]

Sharon: All these years we've had computers, I've never had a decent mailing list program. [Sighs.]

Me: But they can't call it Utopia because four other companies are fighting over the name.

Stephanie: So what are they going to call it?

Me: "Bob."

[Incredulous stares from Sharon and the kids.]

Andrew: Bob?

Stephanie [looking mistrustfully, to see if I'm kidding]: Bob??

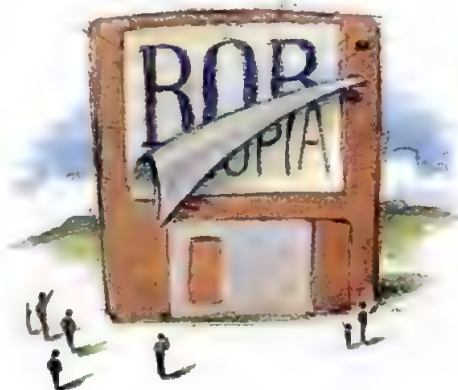
Sharon: Oh, that's awful!

Andrew: No way, dude! [Pauses, worried.] Are they renaming Rover?

Me: No, Bob is the name of the product. Rover is still Rover.

Sharon: There's no way I'm going to tell my friends that I use "Bob" to pay my bills. That really is terrible. It sounds like they just gave up and pulled a name out of a hat.

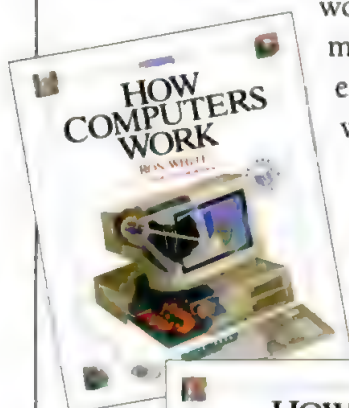
Stephanie: I'd be embarrassed to go into a store and ask for "Bob." They'd think



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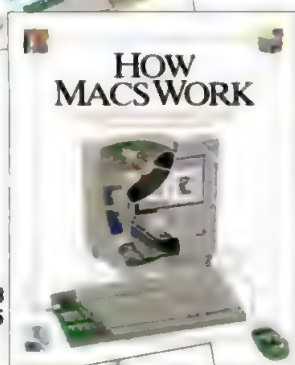
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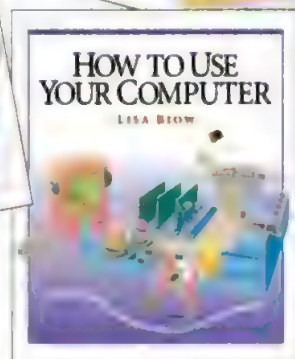


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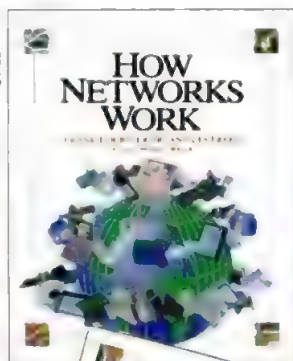


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Bill Machrone

I wanted one of the salesmen.

Me: Then you ask for "Microsoft Bob."

Stephanie: Better they should name it "Microsoft Bill" and put Bill Gates's picture on the box.

[Andrew falls off his chair laughing. Stern words from his parents have no effect.]

Sharon [going into problem-solving mode]: Come on. They could come up with a better name than that. How about "Microsoft Home"?

Me: The division that's producing it is called Microsoft Home. So you'd wind up with "Microsoft Home Home."

[More uncontrolled hilarity from Andrew.]

Stephanie: How about "Casa"? That means "home" in at least three languages.

Sharon: The root of Utopia is *topos*, which means "a place." Why not just call it "Place"? Anything's better than Bob.

[Derisive comments from the kids, who act out a lengthy scene of going to the software store to buy Bob.]

Andrew: How about "HomeWorks"? No—sounds too much like homework.

Sharon: "PlaceWorks."

Stephanie: "Guide."

Me: "Rover."

Needless to say, we didn't resolve the issue of the name.

The kids really did like the animated guides and the ability to create private places on the family machine, but all the flexibility can be a detriment. Stephanie, in a fit of teenage moral angst, said, "I think that all the decorating you can do in the rooms is distracting. You can waste a lot of time instead of getting your work done." She was speaking from experience.

A number of companies are building Bob-compatible add-ons, and this interface will exist in parallel with Windows 95. Microsoft has doubtless seen the profusion of "easy" interfaces on machines like Compaq's Presario line and the Packard Bells as A Bad Thing. Windows 95 is a lot easier to use than previous versions, but it still gives neophytes minimal clues as to what they can and can't do. I expect Bob to take over the easy-interface market and be bundled on machines aimed at the home.

Bob's underlying architecture is quite sophisticated, and it uses some of Microsoft's best and newest technology. I think a business version, with cool office suites, is inevitable. Perhaps they'll name that Robert. □

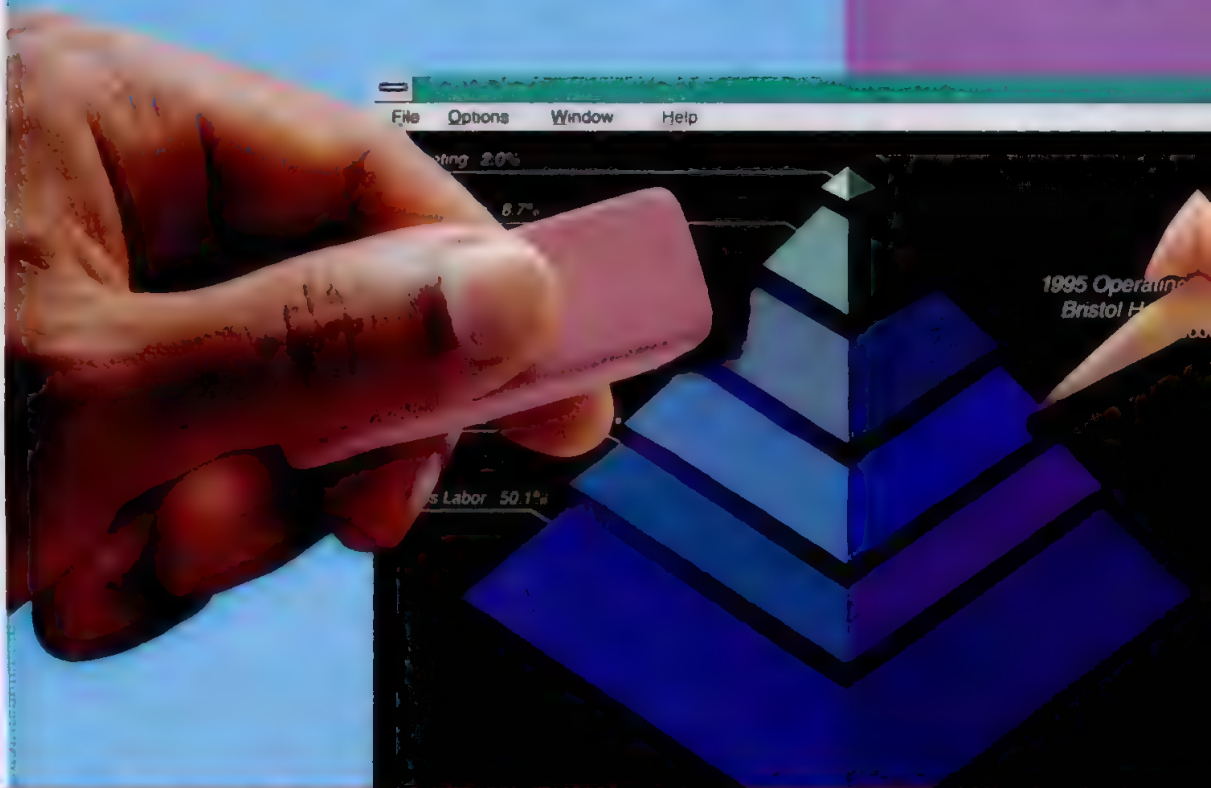
A computer monitor sits on a desk in a dimly lit room. The screen is dark, but the text 'Say goodbye to working in an isolation chamber.' is displayed in a bright orange-red serif font. The monitor is connected to a base and sits on a light-colored desk surface. The background is dark and out of focus.

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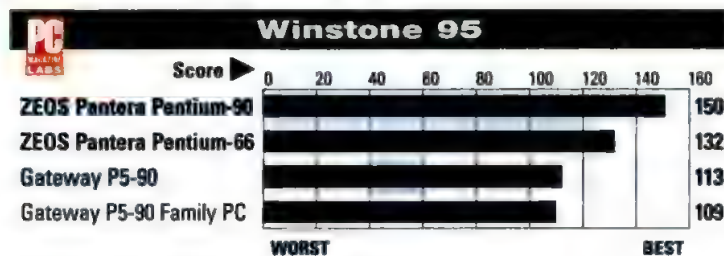


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John C. Dvorak

To Warp or Not to Warp

That is the question. I've been using IBM's OS/2 Warp since its beta release and now have enough experience with it to discuss its pros and cons rationally. I use the term *rationally* because this operating system prompts an emotional response if

you don't get it running right, which you probably won't at first. In keeping with OS/2's history, Warp is so complex and ambitious that parts of it drift into uncharted territory. Once you do get it working right, you will prefer Warp to just about everything else.

When I first played with the beta code, I found it incredibly sluggish and considered going to Windows NT as my power OS. I do have one machine running NT, but overall I found Warp much more compatible with Windows 3.1 apps. Once I got the final shrink-wrapped Warp release, I found the system fast and powerful.

The catch is that Warp's miserable installation program mishandled various Diamond video cards that I use. On one machine, the installation program completely misread the card and installed the wrong drivers. IBM support had to come to the rescue. On another machine equipped with a Stealth 64 card, I had to scrounge around to get drivers. I'm switching to cards with more OS/2 support as soon as I can.

A word of advice: Make sure your video cards are fully supported, and if not, find out which cards are supported by the installation program and use them. Life is too short to muck around with a favorite card that Warp doesn't support. On the other hand, various CD-ROMs seem to be well supported.

Now for the really bad news, OS/2 doesn't support DOOM in a VDM (virtual DOS machine). I was told that IBM was going to make sure that 99 percent of the popular DOS programs worked in a VDM, and what do you know? The most popular game in history won't run. This is proof positive of the cluelessness of IBM's middle management. To play Doom on a Warp system, you have to boot DOS from a floppy, and dedicate your whole

machine to DOOM.

With Warp's initial release, users who wanted to run Windows and Windows applications had to be running Windows already. IBM has now built in Windows code, which is a mixed blessing. I prefer the initial separate approach because I run OS/2 Warp and Microsoft's Windows for Workgroups. The two work together seamlessly and intelligently. You can migrate the Windows file manager to the OS/2 desktop, and use it as a desktop program launcher as if it were part of OS/2 itself.

I can also have a phenomenal number of programs running at the same time, and have yet to find a stray Windows program that hasn't run fine. I even have Microsoft Bookshelf for Windows on the OS/2 desktop, and I can access it anytime, anyplace.

So am I recommending OS/2 Warp? Well, I use it on two of my production workstations, where I do all my writing, research, and on-line work. It has a solid comfortable feel that I don't get with Windows. With Windows I feel like I'm driving a flashy sports car that has no gas gauge and gets an undetermined number of miles per gallon. It could crap out when it's inconvenient but it looks good and is fun.

OS/2 is more like a reliable station wagon with a big engine. It gets you there fast and holds a lot of people. Sexy it ain't, but it doesn't disappoint. People who like computers will like OS/2 Warp. People who are still weaning themselves from DOS programs will love Warp. And people who have found true multitasking useful have few alternatives.

Whether these users will be enough to sustain OS/2 Warp remains to be seen. But until the climax of this drama—probably a few years away—I'll be happy using OS/2. □



Warp prompts an emotional response if you don't get it running right.

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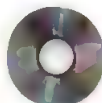


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Inside Track

Shooting Yourself in the Foot Dept.: Once a year a classic **bonehead** decision is made by a large company. This year the award goes to CompuServe for deciding that it should collect royalties on its .GIF format. In conjunction with Unisys, the developer of the underlying data-com-

pression algorithm, the on-line service is demanding that any software vendor that utilizes .GIF in the form of a viewer or even a file converter must pay to use the format. What this means is that the **cheapskate graphics community** will simply abandon .GIF in favor of JPEG, which is already becoming popular because it creates a file one-quarter the size of a .GIF file. This means a **75 percent reduction in download time**. It seems to me that CompuServe is in business to sell computer time, not to collect nickels and dimes in licensing fees for nonessential software. By forcing people to use JPEG it's cutting its own throat. This is simply a dumb idea. It's no surprise that Unisys is in on it. Here's a company that threw away the brand name Univac, which was **synonymous** with computer and once appeared in the dictionary. **Makes you wonder** about corporate America's decision-making prowess.

Letter from Haifa Dept.: Dan Conde of Microsoft's Windows NT group sent me a message, to wit: *I've taken note of the fact that you've referred to various front ends for Windows NT, including the OS/2 (Presentation Manager) shell. You are correct that such a shell was developed at our R & D facilities in Haifa, Israel.*

We have developed this product, called the Microsoft Windows NT Add-On Subsystem, for Presentation Manager as a way for Windows NT customers to run 16-bit Presentation Manager 1.21 and 1.3 applications. These two releases are the last two 16-bit versions of PM released by Microsoft.

We created this product for our customers who have made a commitment to Microsoft's Presentation Manager products. This product was developed to help these customers preserve their investment in their applications as they migrate them from OS/2 over to Windows NT. It is important that we make it clear that this product was not developed to make Windows NT look like OS/2.

The plot thickens.

While on the Subject of Plots Dept.: I had a discussion with Andrew Schulman, the guy who blew the lid off the Windows 95 "new-from-the-ground-up" malarkey. He revealed that Chicago (a.k.a. Windows 95) is really the same old DOS/Windows combination

I'm watching the Bob demo and ask an old man what he thinks. Personally, I view this thing as a tool for idiots who are too lazy to learn the rudiments of simple computer use. "It's extraordinary!" he says.

made to look integrated. He mentioned that he was **baffled** by Microsoft's insistence on using the term *integrated*, as in integrated environment, integrated operating system, and so on. Exactly what was the point of it? Since his book *Unauthorized Windows 95* appeared, Will Zachmann—former *PC Magazine* columnist—revealed that in the Justice Department's slap on the wrist against Microsoft there were **certain provisions** made regarding "integrated" operating systems. It is possible that Microsoft can go back to its old ways if it has a new "integrated OS" rather than DOS/Windows. He claims that **semantics and skulduggery** are the real products from Redmond. **Is it possi-**

ble that these revelations are what made Microsoft push back the Windows 95 announcements, lest the Feds get wind of this? I suspect the **code scramblers** are hard at work as we speak.

Meanwhile, Bob comes to the rescue. **Microsoft Home**, in the meantime, has released a shell program called Bob. It's an interactive **cutesy program loader** and virtual "escort" with a cast of characters that helps PC neophytes better use the computer. It reminded me of Kid Desk, a child's program from Edmark. You'll be reading plenty of reviews and comments about this thing in the months ahead. I saw it at the Consumer Electronics Show (where an extraordinary number of computer companies exhibited, including Compaq and others who steer clear of exhibiting at Comdex.) So I'm watching the Bob demo and I turn to an old man standing there and ask him what he thinks of this **silliness**. You should note that I view this thing as a tool **for idiots** who are too lazy to learn the rudiments of simple computer use—snob that I am. "It's extraordinary!" he says. Other *PC Magazine* staffers got this typical response: "I'd get a computer if I could have *that!*" Microsoft used social scientists in addition to programmers to develop the product. It's possible that they're on to something that will actually expand the market. I guess I'll have to **run it by my mom** and see what she thinks.

This was the first year that Macworld Expo and CES took place at the **same time**, and I attended both shows. Both were packed. The parking lot for Macworld Expo was the San Francisco Cow Palace (no kidding), from which they bused you into the city. CES was no less a zoo. My conclusion regarding all this is that these shows are bloated, and getting bigger with no end in sight. It's horrible.

A crash is due. □



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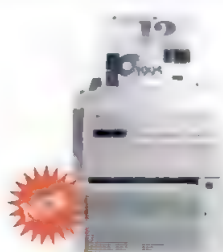
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Jim Seymour

CD Recording Tips

Rolling your own CDs isn't hard—and as we saw last issue, it can be enormously useful. With CD-ROM recorders (CD-Rs) ranging from \$2,500 to \$3,500 and blank disks averaging from \$10 to \$12, and with vastly better software to manage the recording

process becoming available, CD-Rs are becoming ordinary peripherals.

But there is a multitude of nasty little gotchas along the way to turning out perfect CD-Rs. Since a single mistake in printing or burning a CD-R blank blows the entire disk—you can't erase your mistakes by recording over them—those little gotchas can get expensive awfully fast.

Most problems arise from failing to keep the pipeline full as your PC pumps data over to the CD-ROM recorder. This isn't a stop/start procedure, as far as the CD-R is concerned. Your entire session must be recorded in one continuous datastream, though most CD-Rs let you produce multisession disks consisting of two or more sessions.

The software used to assemble CD-Rs is critical. It has to guide you through choosing the files to move to the CD-R: putting them into an efficient sequence, managing both conventional data and digital-audio file formats, calculating the CD space requirements of the files you select, then shipping the data to the CD recorder in that uninterrupted datastream.

CD recorders use on-board buffers to cache incoming data, then feed it to the laser that's writing the optical disk. As long as the CD-production software and your PC can keep filling that buffer from the top (so to speak) while the CD recorder is drawing it off from the bottom, you won't have problems. But under-run the buffer and you blow an expensive blank disk and at least half an hour of your precious time.

I've used several CD-recording software packages and I never found one I really liked until I began working with Corel Corp.'s new CD Creator. I now routinely burn CD-ROMs in my Kodak PCD Writer 225 recorder with CD Creator;

this hardware and software combination is so easy to use and reliable that I can't imagine going back to CDs as a read-only medium.

Though there are many appealing features about CD Creator, from its drag-and-drop assembly of the list of files to be recorded on your CD to its Microsoft-type Wizards to walk you through the recording process, its coolest feature is its trial-run capability.

With your CD recorder turned on and a blank disk in the drive, tell CD Creator to simulate recording a disk. It goes through the motions, makes sure it can build an error-free disk, then reports its success or failure. The laser in the CD recorder isn't at full power during the simulation, so nothing is recorded and the disk isn't used. Slick.

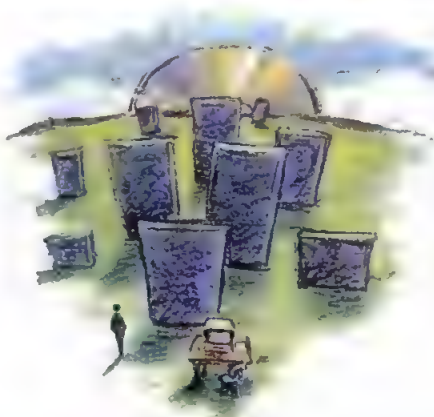
TIPS FROM THE TRENCHES

Here are a few tips for making CD recording a happy experience.

Add a second SCSI controller. I can't overemphasize the importance of a fast, smooth flow of data to the CD recorder. If you're controlling both your PC's hard disk and the CD recorder from the same SCSI interface

card, you may encounter strange and hard-to-trace problems. Eventually, you'll probably discover that the controller can't pump data between drives fast enough. Try your present SCSI controller—especially if it's an up-to-date PCI-bus SCSI-2 card—but be prepared to install a second SCSI card dedicated to your CD recorder if you have erratic recording results. I've used both Adaptec and Future Domain SCSI-2 controllers with great success.

Buy a big, fast hard disk. Burning CD-Rs from a sec-



Burning your own CD-ROM isn't hard, but there are gotchas standing between you and a perfect CD-R.

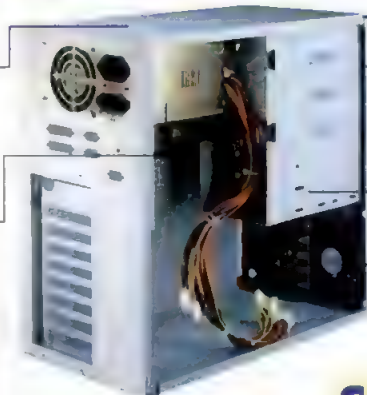
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Jim Seymour

ond big, fast hard disk makes your life a lot easier. Look for a 1GB or 2GB SCSI-2 drive, and make sure the one you choose does *not* use thermal recalibration, a process that stops from time to time to adjust head movement to compensate for changes in temperature. "T-cals" may be a smart way of optimizing drive density and accuracy, but they wreak havoc with CD-Rs' demands for a nonstop datastream.

Store your temp files on a fast local disk. Never, ever try to burn a CD-R using a network drive for the temporary files you'll feed to the recordable disk. A single network slowdown will sink the boat.

Don't burn CD-Rs from a compressed disk. The modest delays in data access induced by Stacker, DoubleSpace, and DriveSpace can be just enough to break the all-important continuous datastream required for successful recording.

Defrag the disk from which you create CD-ROMs. Every bit of speed helps; defrag often, even if your defragging utility (such as DOS's ScanDisk or Norton's SpeedDisk) says that your hard disk is only somewhat fragmented.

Consider ISO 9660 disks. Most CD-creation software will let you choose either MS-DOS or ISO 9660 formats. The former makes sense in a PC-only environment, but 9660s are readable by PCs, Macs, and Unix boxes, which makes them perfect for multi-platform environments.

Avoid multiple-session disks. If you're making a CD-R as a master for a disk-duplication firm, it *must* be a single-session, write-protected disk. Multiple-session disks also have a lot more overhead, leaving less room for your data, and they are slower to read.

Don't necessarily run your CD-R at its top speed. Just as with CD players, recorders are available in 1X, 2X, and 4X speeds. At 4X, a recorder will write a full 73-minute/650MB CD in under 20 minutes. That sounds like a great time-saving device, but 4X recording stresses every part of your system's ability to deliver an uninterrupted datastream during recording. Make certain your whole system setup—not just your recorder—can support 4X, or back off and run the recorder at 2X.

Have fun. Making your own CDs is a gas. But remember to buy a lot of blanks: You're going to be knee-deep in this before you know what happened. □



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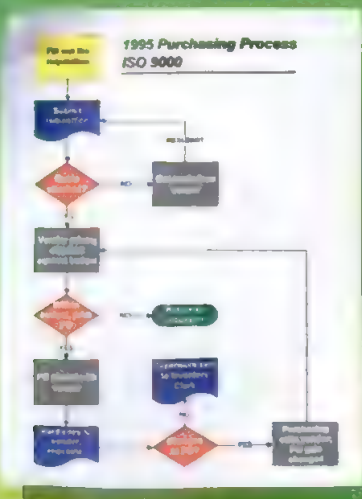
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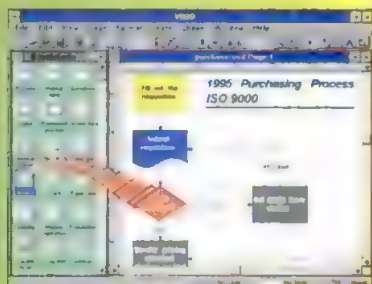


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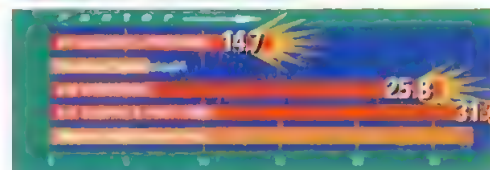
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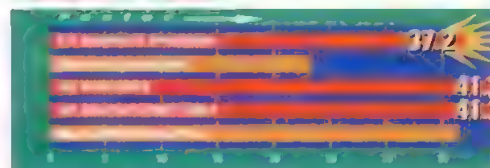
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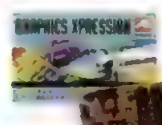
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Bill Howard

The Tyranny of the Minority

With all the attention paid to the home and SOHO market, you'd think that the majority of PC users were novices and the only ease-of-use issue that mattered was providing electronic training wheels for Microsoft Windows. The needs of novices

are being addressed, however imperfectly, by Windows front ends, such as Tabworks or Knowledge Navigator, and Bob—Microsoft's new front end. Front ends, unfortunately, handle only a few tasks well: launching a program, formatting a floppy disk, or starting a welcome video from the company whose PC you just bought.

I've seen glacial progress in making Windows easier for the general business user and the power user—the people who've been using Windows for several years, and the people who constitute the majority of Windows users. The underlying problem is that Microsoft has made Windows a one-size-fits-all solution. And just like one-size-fits-all clothes, they're ill fitting for most of us, but not so bad that you want to blast flame mail to usability_lab@microsoft.com. What's wrong? Here are some specifics:

The multilevel dialog box. Sometimes as I'm opening and closing all the dialog box layers in Windows, I feel as if I'm trapped four caverns deep in the old 1980s text game *Adventure*, and I want to type into my console: "Drop coins. Pick up stick. Swat Bill Gates." For example, if you want to change your printer from portrait to landscape mode, you might have to go through a drop-down menu comprising eight steps and three dialog box layers, and that's if you get it right. The steps, working through a word processor such as Word for Windows are: (1) Alt-File. (2) Print. (Don't pick Options here, although it's a dialog box choice with some printers; these are different options.) (3) Printer. (4) Options. (5) Landscape. (6) OK. (7) Close. (8) OK. It's nine steps if you go through Control Panel, assuming you remember Control Panel lives in the Main program group, not Accessories.

My recommended solution: a single-layer dialog

box option. Yes, there will be more choices staring at you all at once, but so what. You have the traditional dialog box as a fallback. At the very least, how about an OK, Close All Layers Now command so you don't have to repeatedly click OK, Close, OK to exit the dialog box.

Art-imitates-life applets and oversized on-screen boxes. The CD audio player and the phone/answering machine telephony applets are styled to mimic the look of the physical devices they replace. How cute—for a Warholian 15 minutes. These on-screen boom box replicas also take up immense chunks of on-screen real estate, as do dialog boxes where usability experts have decreed there should be *x* pixels separating choices and lots of restful blank space surrounding everything.

My recommended solution: Three sizes for miniapplets (and dialog boxes): existing size and style; half-size without the cute embellishments; and always-on-top postage stamps that control three or four vital functions.

Mini-list boxes. While the applets are too big, the list boxes (where you choose a file, for instance) are too small. A list box might be only six or eight choices deep in a directory of 120 files, which means lots of scrolling.

My recommended solution: Let the user expand the list box to 20 or even 50 entries. In fixed-choice list boxes, such as printer paper choices (only four items deep), let the user hide choices he might never use, so the ones you do want all fit on-screen at once without scrolling.

In terms of making things easier for those of us already comfortable in the Windows environment, some progress has been made, but it's only just begun. I don't believe Windows Late 95 will do more than scratch the surface, and the relief Chicago affords is still many months off. □



Windows front ends make life easier for novices. Who's watching out for the skilled users?

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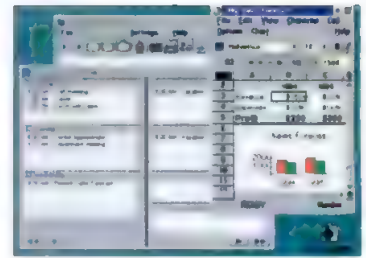
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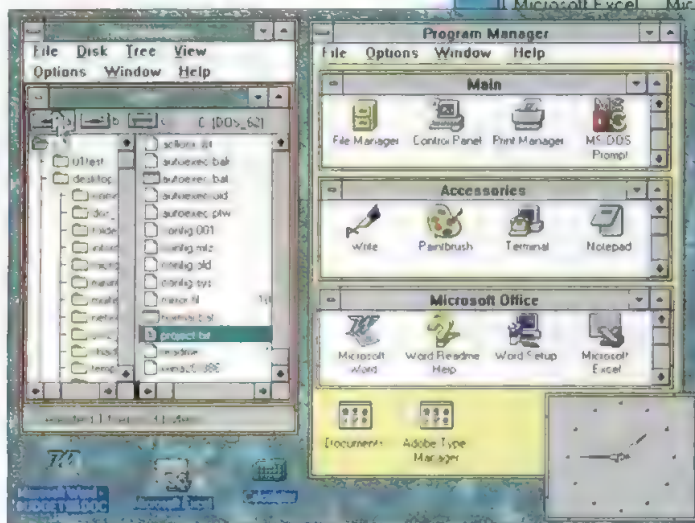
Today's Windows utilities offer the interface that Windows never had—and that upgrades can only promise.

By Thomas Mace and Barry Simon

Windows has not aged gracefully. But as the world's most popular GUI enters its fourth year without a major upgrade, it's clearly far from dead. Every day, millions of people battle its quirks and limitations in order to run Windows software—software that's usually more advanced than Windows itself. Yes, an upgrade is on the way. Microsoft Windows 95, with its completely redesigned interface, is scheduled to debut late this summer. But how

PAST HISTORY

THE WINDOWS 3.1 interface, familiar but flawed, implements many GUI features—but only skin-deep. Groups are not real folders, and file management is not integrated into Program Manager's group-centric view of your work.



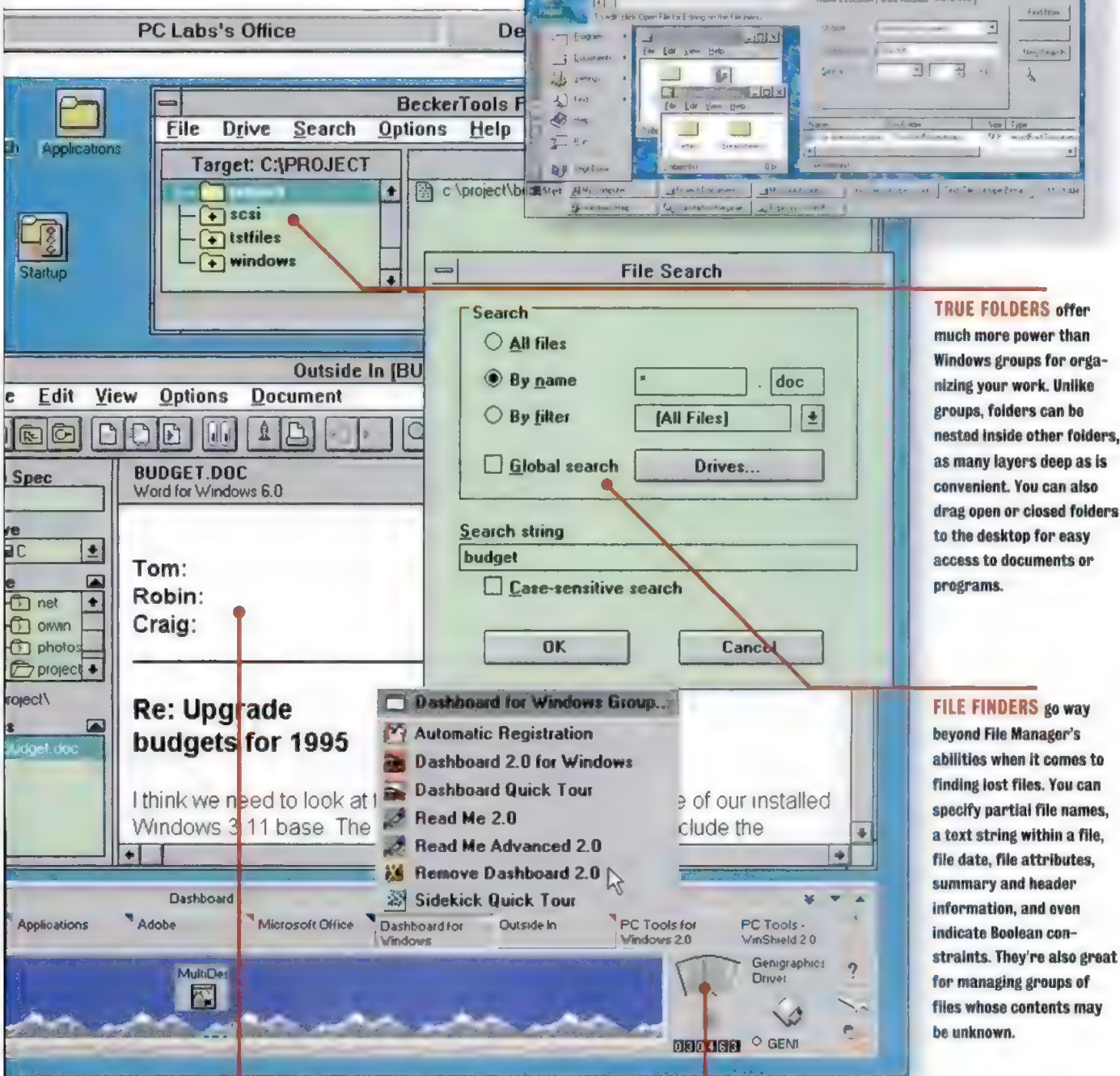
TODAY
WINDOWS UTILITIES
can provide a rich folder-based interface and powerful tools that Windows 3.1 can't touch.



VIRTUAL DESKTOP managers make it easy to arrange multiple Windows desktops and switch between them instantly.

SOMEDAY

WINDOWS 95 will give you most but not all of the features available from today's Windows utilities, including true nestable folders, folder-oriented file management, a launch bar, viewers, and an enhanced file-find utility. But how soon will it arrive? And how long will you wait before you upgrade?



TRUE FOLDERS offer much more power than Windows groups for organizing your work. Unlike groups, folders can be nested inside other folders, as many layers deep as is convenient. You can also drag open or closed folders to the desktop for easy access to documents or programs.

FILE FINDERS go way beyond File Manager's abilities when it comes to finding lost files. You can specify partial file names, a text string within a file, file date, file attributes, summary and header information, and even indicate Boolean constraints. They're also great for managing groups of files whose contents may be unknown.

VIEWERS let you view files created in many programs—without loading the parent application. They're ideal for everything from browsing e-mail attachments to viewing compressed files.

SYSTEM MONITORS can quickly clue you in on your memory and GDI resources, your remaining disk space, or what Windows mode you're running in. Some even suggest tuning tweaks.

soon will you be upgrading? For many users, probably a majority, it might just as well be called Windows 96.

Don't resign yourself to just waiting. You can significantly enhance the usability of Windows today. Virtually all of the interface enhancements promised by Windows 95—including true folders, pop-up launch menus, a quick-launch bar, integrated file management, file viewers, and sophisticated file finding—are available today from the 35 shell replacements, shell enhancements, file managers, file viewers, and file finders reviewed in the following pages.

WHAT'S WRONG WITH WINDOWS?

As Mac or OS/2 users are quick to point out, Windows borrows many basic elements from other GUIs, including program and document icons, folders (called groups), and graphical file management.

But the way Windows implements them imposes some big constraints. Program Manager groups, the basic organizational units, can't be placed inside other groups, so you're forever stuck with a one-layer model for arranging your work. Nor can you drag groups or their contents out of Program Manager to the desktop for easy access. Windows File Manager isn't integrated into Program Manager: It won't let you view even simple text, and its search capabilities are limited. It also won't let you view your files in terms of groups, the way you've got them carefully arranged in Program Manager. These aren't just academic problems: They affect your ability to organize your work, launch and switch between applications, and manage files.

TOTAL MAKEOVER

One solution is a total makeover, a completely new Windows shell with significant

added functionality. The giants in this category are Symantec's The Norton Desktop for Windows 3.0 and Central Point's PC Tools for Windows 2.0. Both replace Program Manager with a true folder-based system. PC Tools, in particular, creates a look and feel you might associate with advanced operating systems like OS/2. True folders can contain applications, documents, and, most important, other folders. Open and closed folders can be dragged to the desktop and left for easy access. These two products also offer dozens of utilities, including disk defraggers, system resource monitors, launch buttons, file viewers, and file finders.

Among the lighter shells, Vitesse's Salvation 1.2, Quarterdesk's SideBar for Windows 1.0, and Lucid's Third Dimension 2.1 offer various combinations of folder-based desktop organization, quick-launch bars or buttons, and file management utilities.

Windows utilities:

- **Dashboard, Version 2.0**
- **Outside In/for Windows, Version 2.1H**
- **PC Tools for Windows, Version 2.0**
- **Praxim, Release 1.0**
- **XTreeGold for Windows, Version 4.0**

Necessity is proverbially the mother of invention, and overcoming the limitations of Windows is getting to be more of a necessity all the time. It's gratifying that so many of the reviewed products do the job so well.

Borland International's Dashboard, Version 2.0, a slim, trim launch bar, wasn't intended to replace Program Manager, but it's more than robust enough to do the trick. Its pop-up menus give you instant access to groups and commonly used items, while its powerful virtual desktop manager gives you transparent control of up to nine times your current desktop real estate.

As a specialized viewer utility, Systems Compatibility Corp.'s Outside In/for Windows, Version 2.1H, is without peer for its ease of use, the number and quality of its viewers, and the aplomb with which it handles complex

documents, embedded graphics, and compressed files. Outside In's integration with standard e-mail systems makes it particularly powerful for sharing documents not supported by local applications, and its file management capabilities are strong enough to make it a plausible file manager in its own right.

If you're looking for a total shell replacement, Central Point Software's PC Tools for Windows, Version 2.0, is the current leader in the field. Its handsome desktop includes the works: nestable draggable folders, easily configurable quick-launch facilities, and

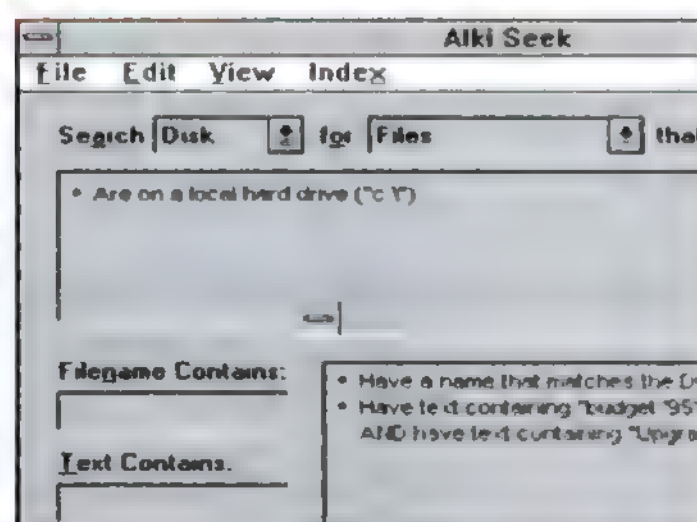
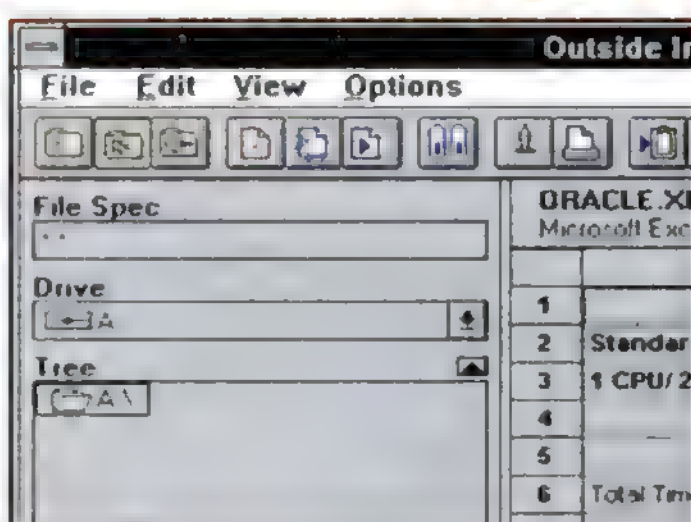
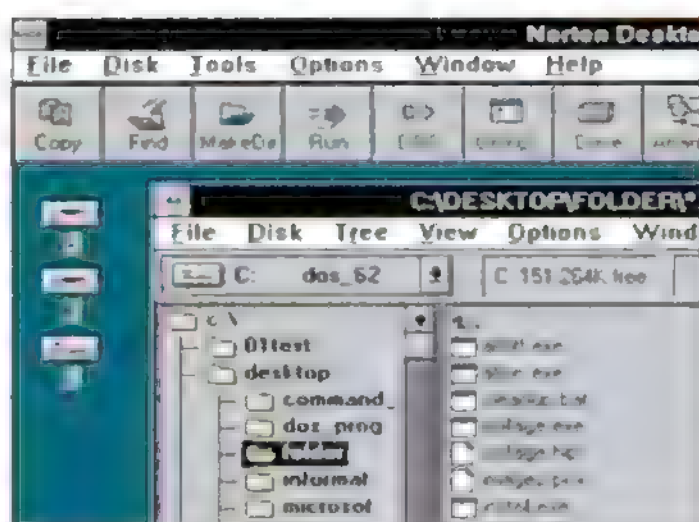
powerful virtual desktop management. Its powerful file management features are provided by a version of XTreeGold for Windows, and its ingenious File Companions handle basic disk and file management from the title bar of any Windows application. PC Tools also includes one of the best utility collections for disk diagnosis and repair, virus scanning, emergency recovery, system tuning, and backup.

For those who prefer the speed of the command line, Wesson International's Praxim, Release 1.0, delivers the most powerful, best-integrated command line interface to Windows. Praxim supports standard DOS commands but also offers its own rich Praxim Command Set. Output from commands streams to a scrollable window where you can launch executables just by double-clicking on the listing. Praxim also offers quick-launch toolboxes for easier access to Windows groups, batch files, or Praxim commands.

As a dedicated file management tool, Central Point Software's XTreeGold for Windows, Version 4.0, will exceed the expectations of those who remember the venerable DOS product. Its power, flexibility, and ease of use are second to none, while its viewers rival those of some dedicated tools.



WINDOWS UTILITIES: A QUICK TAKE



Shells, Interface Enhancements, File Launchers
see page 116

File Managers and Viewers
see page 144

File Finders
see page 161

What's reviewed in this category

Dashboard 2.0, Do-Over! 1.0a, FrontRunner 1.03, Hotwin 3.5, K-U-I 1.1, METZ Task Manager 2.11, for The Norton Desktop Windows 3.0, OnTop 1.0, PC Tools for Windows 2.0, Plug-In for Windows 2.2, Praxim 1.0, Salvation 1.2, SideBar for Windows 1.0, SpinWizard 1.1.1a, TabWorks 1.1, Third Dimension 2.1, ToolPAL 2.0, WindowMagic 3.0, WinMaster 1.5

What these utilities can do for you

Typical features include a Mac-like interface that lets you place closed or open groups directly on your desktop, nest one group within another many layers deep, assign special icons to closed groups, and move items to any location through drag-and-drop. Some packages also offer virtual desktops that let you multiply your screen real estate.

Where Windows falls short

Program Manager groups can't be nested within other groups, and all closed groups display the same icon. Groups, documents, or closed applications cannot be placed on the desktop, and virtual desktops are not available. Only limited system information is displayed, and utilities such as finders, viewers, backup, and virus protection aren't provided.

Who needs them most

You routinely juggle multiple documents and applications. The major shell replacements offer a host of tools for more rational organization and better productivity.

BeckerTools 4.0, Drag And File 2.0, KEYview 4.1, Outside In/for Windows 2.1H, Panoramic! for Windows 1.1, XTreeGold for Windows 4.0

File managers focus on easy visual management of files and directories, whether you're creating, searching for, copying, moving, sorting, deleting, undeleting, viewing, or setting the attributes of files or groups of files. Dedicated viewers let you see the contents of many file formats without having to load the application.

Windows File Manager, which must be launched separately, provides basic file management features but no extras such as compression, encryption, or undelete. File-selection and sort options are awkward to apply. File viewers aren't provided, and even the DOS Type command can't be run from File Manager.

Your local or network directory structures are complex, and you need to track and manage large numbers of files. Viewers are ideal for quickly accessing the contents of documents or graphics created with a wide variety of programs.

Alki Seek 3.0, dtSearch 3.02, Eclipse Find 1.02

File finders are dedicated tools for finding misplaced files or those whose names or contents are only partially known. Finders may work by scanning the disk or by maintaining a dedicated index. You can typically narrow your search by specifying drives, a path, a partial file name with wildcards, file attributes, or a text string inside the file.

Windows search capabilities, via File Manager, are limited to path- and wildcard-based searches only. You cannot search based on file contents.

You frequently find yourself unable to locate files, or you may need to manage many files at times when you do not know the exact filenames or contents.

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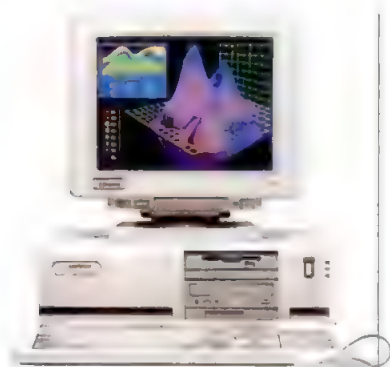
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Suitability to Task: Windows Utilities

The kitchen-sink richness of many of the reviewed programs makes them a taxonomic headache. You can't always pigeonhole them into neat, clear-cut categories. To help you see what these packages can do and how well they do it, we rated each according to its performance on some or all of the following tasks. We selected the tasks to evaluate on the basis of each product's published feature set.

To judge **desktop organization**, we looked at a product's ability to provide true folders and nested subfolders that can be freely placed on the desktop. If the product does not use a folder metaphor, we rated the general power and accessibility of its interface. Packages not intended as full shell replacements were judged on the strength of their quick-launch features such as group lists, launch lists, launch bars, and button palettes. The

Some products, such as XSoft's TabWorks 1.1, simply offer a new way of looking at Windows groups. A total shell replacement raises another question: Why not replace the whole operating system underneath? One strong candidate, IBM's OS/2 Warp, Version 3, already offers many shell features slated for Windows 95 (see the sidebar "OS/2 Warp: A True Alternative").

WORKING WITHIN THE SYSTEM

Instead of replacing the Windows interface altogether, you might want to try enhancing it. One of the most comprehensive shell enhancers, Borland's Dashboard 2.0, provides pop-up group lists, quick-launch buttons for documents or applications, a system resource monitor, and a virtual desktop manager—a powerful desktop-expanding convenience feature also found in TMA Software's Hotwin 3.5, PC Tools, and Digital Artistry's ToolPAL 2.0.

Many of the lighter shell enhancers concentrate on launching. ToolPAL 2.0 and PC-Kwik's WinMaster 1.5 both use button palettes for the job. Plannet Crafters' Plug-In for Windows 2.2 and WinWear's WindowMagic 3.0 offer ac-

SUITABILITY TO TASK		
	Product Name	
	Power	Ease of Use
Desktop organization	EXCELLENT	EXCELLENT
File management	GOOD	POOR
File viewing	FAIR	FAIR
Automation	POOR	GOOD
File finding	EXCELLENT	EXCELLENT

ability to switch easily between virtual desktops is a plus, as are system status indicators or utilities for easily switching between Windows printer drivers.

Under **file management**, we looked for a strong and intuitive set of file and disk management features that go well beyond those of File Manager. We rated products claiming archive management on the ease of archive handling, compatibility with formats such as PKZIP, and the ability to view the contents of your archives.

cessible, nestable groups. Thoughtware's OnTop 1.0 provides a simple launch list, while Tanisys Technology's SpinWizard 1.1.1a organizes your icons on an eight-sided carousel that you can spin with your mouse. Kansmen's Do-Over! 1.0a gives you a simple Windows 95-style Taskbar for task switching. METZ Software's METZ Task Manager 2.11 provides an enhanced replacement for the Windows Task List. For the mouse-shy, Phar Lap Software's FrontRunner 1.03 and Wesson International's Praxim 1.0 offer a powerful command line integrated into the Windows environment, while Softac's K-U-I 1.1 is simply a keyboard interface for Windows itself.

MANAGING, VIEWING, FINDING FILES

File management utilities can offer far more power than the Windows File Manager for manipulating groups of files. File-viewer utilities let you view files created by many different applications without having to load the underlying application—a boon for e-mail attachments or on-the-road computing. Keyword Office Technologies' KEYview 4.1, Systems Compatibility

To evaluate **file viewing**, we tested the quality and breadth of the supplied viewers using a variety of complex document and graphics formats. Can the product handle embedded graphics and compound OLE documents seamlessly? The ability to view archives and archives within archives earns extra points, as does the ability to integrate with third-party products such as e-mail packages.

For products with **automation** features, we looked at the power of any supplied batch or macro languages and the abilities of the product's macro recorder. Can you edit recorded scripts? The ability to compile macros to a standalone executable is a bonus.

Under **file finding**, we judged the power of text-based and combined text-and-wildcard searches. Can you include Boolean conditions? Does the product create an index for easy searches? How big is the index? High-end text-oriented features such as phrase, phonetic, and fuzzy searching are a plus.

Corp.'s Outside In/for Windows 2.1, and Cimmetry Systems' Panoramic! for Windows 1.1 are strictly viewers, while Abacus Software's BeckerTools 4.0, Canyon Software's Drag And File 2.0, and Central Point's XtreeGold for Windows 4.0 combine general file and disk management with some viewer components. Windows File Manager add-ins can also help with file management (for details, see the sidebar "File Manager Makeovers"). Archive managers, a specialized utility type, let you manage compressed archive files (see the sidebar "Zipping with a Friendly Face").

File finders are power tools that can search for files based on filename or contents. Content searches can be based on words, whole phrases, Boolean operators, fuzzy searches, or phonetic searches. Phoenix Technologies' Eclipse Find 1.02 is strong on searching by file criteria but weaker on content searching. DT Software's dtSearch 3.02 is strong on content searches but has only minimal filename searching abilities. Alki Software's Alki Seek 3.0 for Windows is strong in both areas.

The 35 Windows utilities we've evaluated offer everything from a completely new Windows shell to beefed-up functionality in a single area. Whatever type you're interested in, these utilities let you expand the power of Windows—without having to wait for that upgrade.

Our Contributors: SHERYL CANTER and BARRY SIMON are contributing editors to *PC Magazine*. ELISABETH HOLZER is a staff editor and CADE METZ is an editorial researcher at *PC Magazine*. DEVAL SHAH is a technical analyst at PC Magazine Labs. THOMAS MACE was the associate editor in charge of this story, and JAY MUNRO was the project leader.



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PC WORLD, Systems Top 20, Feb. 1995

PC MAGAZINE

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PC MAGAZINE, Cover Story: Color Portables, Jan. 1995

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PC LAPTOP, 1994 Editor's Choice Awards, Jan. 1995

"The WinBook XP is a color notebook that's designed well, feels sturdy and offers great value."

PC LAPTOP, Review: WinBook XP, Dec. 1994

WINDOWS MAGAZINE

"The WinBook XP represents the best kind of innovation in the rapidly changing field of notebook computers. It keeps the best of proven technologies, such as a sharp display, and complements them with new technologies, such as those employed to stretch battery life. The long battery life makes it a good choice for anyone who needs a basic notebook that also delivers solid performance."

WINDOWS MAGAZINE, WinLab First Impressions, Dec. 1994

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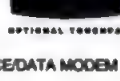
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Borland International Inc.
EDITORS' CHOICE
Dashboard

BY BARRY SIMON

Dashboard, Version 2.0, packs a big organizational wallop into an impressively small piece of screen real estate. In its default configuration as a horizontal utility bar, it offers a row of tabs along the top representing Program Manager groups. Below this row you will find customizable quick-launch buttons for documents or applications, a clock/calendar, a miniaturized manager for virtual desktops, a resource monitor, a printer driver manager, and a configuration button.

Dashboard offers several ways to launch programs. Clicking once on one of its Program Manager group tabs pops up a list of its programs and documents with their corresponding icons. Double-clicking opens a window that looks much like a Program Manager window. You can assign a quick-launch button to an application by dragging an executable file to it.

The virtual desktop manager shows you a series of miniature screens representing sections of your virtual desktop. You can configure from three to nine screens.

Another useful component is a Run box that gives you a DOS prompt with a drop-down list of previous commands.

Dashboard properly handles icons for

the DOS programs it launches, but hotkeys for DOS applications don't work from within other DOS applications. In addition, a hotkey for launching a DOS application will launch a second session of an already running application rather than switching to the running session. Resource usage is just over 10 percent, but Dashboard is versatile enough to act as a replacement for Program Manager. It is an elegant launcher that will be the choice of many looking to streamline Windows.

► **Dashboard, Version 2.0.** List price: \$49.95. Borland International Inc., Scotts Valley, CA; 800-533-0004.

Circle 455 on reader service card

Kansmen Corp.

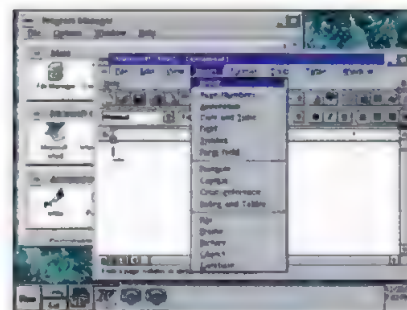
Do-Over!

BY THOMAS MACE

Kansmen's Do-Over!, Version 1.0a, lives up to its name by completely transmogrifying the appearance of Windows. After you install Do-Over! in its default configuration, Windows comes up looking like a goofy cartoonish cross between OS/2 and Motif. But there's more here than fun and games. Do-Over! also gives you a well-thought-out launch bar that bears a strong resemblance to the Taskbar slated for Microsoft Windows 95. And Do-Over!'s visual transformation may actually be a help to novices since many interface elements—scroll bars, minimize and maximize buttons, menu headings, and title bars—get bigger, bolder, and easier to grab. Do-Over! also turns application menu bars, pull-down menus, and child menus into huge, can't-miss-'em text buttons.

Do-Over!'s launch bar, called the Do-Bar, defaults to a position at the bottom of your screen and shows an icon for every currently running application. Simply clicking on an icon maximizes the application to the desktop. This provides an absurdly easy way to toggle between apps and will help novice users avoid the trap of launching a new session of an already-running application when trying to switch back to the existing session. The Do-Bar also provides a Run button that pops up a button palette listing all your Program Manager groups.

As if the post-Do-Over! look of Windows weren't enough, the supplied Do-Over! editor lets you take the facelift even further. Do-Over! comes with 30 prede-



SUITABILITY TO TASK

	Power	Ease of Use
Desktop organization	FAM	EXCELLENT

fined design schemes with names such as Blue Sky and Fire Crackers, each more garish than the next. One of the choices, Chicago, bears a faint resemblance to Microsoft's now-renamed Windows 95 and may help pave the way to an unfamiliar set of controls. Do-Over!'s Edit option lets you customize even further by altering the font, color, size, shadow, and bitmap attributes for an exhaustive list of Windows interface elements. Do-Over! is unquestionably a lot of fun, and it's also one of the easiest, cleanest task switchers around.

► **Do-Over!, Version 1.0a.** List price: \$59. Kansmen Corp., Milpitas, CA; 800-200-9881.

Circle 456 on reader service card

Phar Lap Software Inc.

FrontRunner

BY JAY MUNRO

Those of you who use Windows apps but miss the speed and efficiency of the DOS prompt can now have your cake and eat it, too. Phar Lap Software's \$139 FrontRunner, Version 1.03, is built on a powerful command-line DOS interface that is tightly integrated with the Windows environment. You can use it both as a command prompt and as a replacement for Program Manager.

FrontRunner's centerpiece is the Command Shell Window, its Windows-hosted DOS session. The Command Shell Window lets you cache up to 16,000 lines of screen history, then view, search, copy to the Clipboard, or execute the buffered data. You can run multiple Command Shell Window sessions simultaneously and even cut-and-paste among them seamlessly. You can also execute Win-



SUITABILITY TO TASK

	Power	Ease of Use
Desktop organization	EXCELLENT	EXCELLENT

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OS/2 Warp: A True Alternative

By Thomas Mace

IBM asks a challenging question: Why take a band-aid approach to patching up Microsoft Windows 3.1 when you can run your existing Windows apps under OS/2, a true multitasking operating system with a powerful object-oriented interface?

With the latest OS/2 release, OS/2 Warp, Version 3, IBM finally has a point. Warp has smoothed many rough edges that might once have deterred you, and our tests show it to be a robust and sophisticated platform for running Windows applications (see "OS/2 Warp 3 and Windows NT 3.5: The Future's Here Today," *PC Magazine*, December 20, 1994). What's more, OS/2 delivers a generous share of the bells and whistles offered by the Windows utilities in this review. A hybrid OS/2-Windows solution now represents a true alternative.

OS/2 Warp, the successor to IBM's OS/2 2.1 for Windows, is intended to run underneath your existing copies of Microsoft Windows and DOS (you can also install DOS and Windows after you install Warp). When set up over an existing DOS/Windows installation, OS/2 automatically creates Win-OS/2 folders corresponding to all your Presentation Manager groups. Applications or documents launched from these folders run in a window on the OS/2 desktop without further ado. This setup scenario also automatically installs the OS/2 Boot Manager so that you can continue to boot DOS and Windows normally.

Despite a simple setup, OS/2's support for Windows runs deep—including adept handling of both Windows DDE and OLE 2.0 across separate Win-OS/2 windows. Individual Windows sessions are also highly configurable through over 50 environment settings. You can run Windows apps in Win-OS/2 windows or you can run Windows itself, complete with File and

Program Manager, in a full-screen session. You can also specify whether your Windows apps run in separate virtual machines for crash protection or in a common session to enable interprocess communication like OLE.

ABSTRACT OBJECTS

While these niceties will take a while to explore, the greater flexibility of OS/2's object-oriented Workplace Shell desk-

applications organize files by physical paths. If you use nested OS/2 folders with long descriptive names, you'll find yourself navigating a cryptic sea of subdirectories each time you execute an Open or Save As command. You can use short folder names and little or no folder nesting, but you'll be under-exploiting one of the Workplace Shell's biggest strengths. The native OS/2 method for creating documents—drag-

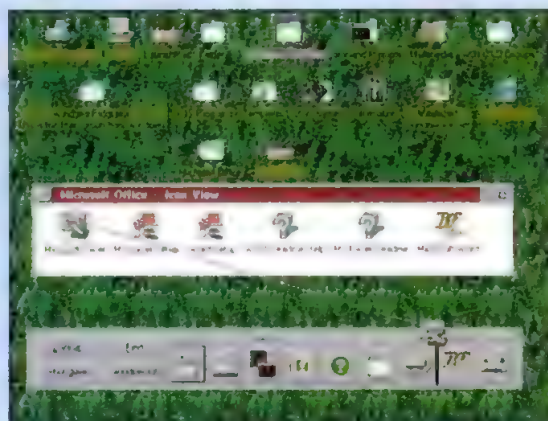
ging an application-specific template to the desktop and opening it to begin work—avoids the problem but lacks spontaneity.

Fortunately, most other Workplace Shell features fit the needs of Windows users seamlessly. The LaunchPad, a significant new productivity feature, furnishes a bar where you can anchor any icon for fast access to documents, applications, printers, tree viewers, and system utilities. OS/2's printer objects support drag-and-drop

behavior, letting you print by simply dropping a document icon on a printer. You can also drag files, program objects, shadows, and resources to the shredder for easy deletion. The Find utility lets you easily locate files using wildcards and a more powerful Seek and Scan Files utility will let you combine file name and text searches. Overall, OS/2 runs Windows apps smoothly and offers a deep object-oriented metaphor for organizing your documents and programs. Clearly, moving to OS/2 requires a bigger commitment that you need to make with other products in this review, but it's an eminently workable alternative. □

► **IBM OS/2 Warp, Version 3.** List price: \$129. IBM Corp., Armonk NY; 800-342-6672.

Circle 483 on reader service card



FAST LAUNCHING: Warp lets you drag any desktop object—including apps, utilities, and documents—to the LaunchPad for easy access.

top is obvious at once. OS/2 uses a uniform icon-and-folder metaphor for organizing every object you interact with. All documents, applications, utilities (like the shredder or file finder) and system resources (such as printers or disks), are represented by icons. You can drag and drop these icons onto the desktop or into long-named folders, and you can nest folders within folders many layers deep.

From the user's perspective, these objects are abstracted from physical directory paths. (Of course, there is a physical directory structure behind the Workplace Shell: Folders are subdirectories with names based on truncated versions of your folder names.)

Windows users will find the high level of abstraction a potential source of confusion, however, since Windows

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dows (and, of course, DOS) programs from the command line.

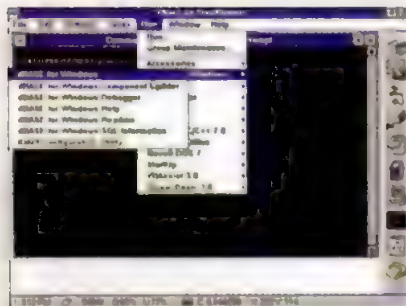
FrontRunner has a Windows application to provide Program Manager-like functions. The moveable Launch Bar, normally located at the top of the FrontRunner window, offers a convenient place to anchor icons for launching your most-used programs and documents. The full contents of your Program Manager groups are also accessible from the pull-down Run menu. A Group Maintenance dialog lets you drag-and-drop applications from your Windows program groups to the Launch Bar, and you can use Group Maintenance to modify groups or create new ones. When FrontRunner is minimized on the desktop, the Launch Bar moves to the side of the screen for easy access. Even in this setup, all groups and configuration dialogs remain easily accessible from a pull-down menu.

FrontRunner offers a powerful set of tools for Windows users who still hearken after DOS. Power users will also appreciate the Visual Batch Language that lets you add Windows features such as an Open File dialog to DOS batch files.

FrontRunner's improvements to Windows are modest, but if command prompt flexibility is what you're really after, you probably won't let that bother you.

► **FrontRunner, Version 1.03.** List price: \$139. Phar Lap Software Inc., Cambridge, MA; 800-292-9622.

Circle 457 on reader service card



SUITABILITY TO TASK

FrontRunner

	Power	Ease of Use
Desktop organization	GOOD	FAIR
File management	FAIR	FAIR
Automation	GOOD	FAIR
File finding	FAIR	FAIR

TMA Software

Hotwin

BY BARRY SIMON

TMA Software's \$49.95 Hotwin, Version 3.5, is a true cornucopia of tools for organizing work in Windows. Its strengths include an easily accessible quick-launch menu, virtual desktops, tear-away menus, and more. Hotwin can also place buttons on the title bar of the active application to give you quick access to its functions at any time.

The Hotwin installation automatically installs a submenu for each Program Manager group. The Hotwin menu is accessible by right-double-clicking on the Windows desktop, by means of a hotkey, or from a title-bar button.

Hotwin is one of the few add-ins we saw that correctly handles icons for DOS apps after they've been launched, and it supports hotkeys from within DOS sessions. Hotkeys can be assigned to launch any item, but they can also initiate many Windows functions, such as starting the Windows screen saver, as well as Hotwin functions like switching between virtual desktops.

Hotwin supports up to nine virtual desktops, probably more than enough to get you organized. A Gallery utility provides a graphical virtual desktop manager where you can drag thumbnail representations of applications between desktops.

Tear-off menus are another attractive Hotwin feature. In any Windows application, you can drag any pull-down menu to the right and down, and it becomes a floating button palette.

Other enhancements include Hotwin's support for launching Windows applications from Windows-hosted DOS sessions, support for running the Windows screen saver over DOS sessions, a resource monitor, and an installation assistant.

Sadly, Hotwin's strengths are marred by poor graphical design. Its launch menus are text-only without any application-specific icons, and its title-bar buttons are unattractive. Other than these flaws, the program shines in the power it puts at your fingertips without being intrusive.

► **Hotwin, Version 3.5.** List price: \$49.95. TMA Software, Del Mar, CA; 800-497-3617.

Circle 458 on reader service card



SUITABILITY TO TASK

Hotwin

	Power	Ease of Use
Desktop organization	GOOD	GOOD

Softac Corp.

K-U-I

BY CADE METZ

If you've never liked mice, or if you're in a situation where you can't use one, Softac's \$39.95 K-U-I, Version 1.1, makes Windows accessible from your keyboard. A medium-sized window with a list of hotkeys, a file management menu bar, and a command line let you competently perform most tasks usually handled by a mouse.

K-U-I (Keyboard User Interface) installs in less than a minute, uses less than 600K of disk space, and can be run in place of or in conjunction with the Windows Task List. Once the installation is complete, a terse set of interactive tutorial windows gives you a quick overview of K-U-I hotkeys, which let you instantly launch or switch between applications. Be prepared to spend some time memorizing the myriad predefined hotkeys, however.

Predefined hotkeys are automatically assigned to many but not all applications, and new hotkeys can be easily assigned to new items. The Ctrl-Shft-Spacebar hotkey brings up the K-U-I startup window, which displays a scrollable list of functions and their associated hotkeys. You can also assign English-language aliases to each hotkey combination. These aliases or standard DOS commands can be typed into the K-U-I command line to launch DOS or Windows applications or perform tasks. K-U-I hotkeys remain available within DOS sessions as well.

A mouse-cursor simulation feature, activated by pressing the ScrollLock key, lets you use the keyboard arrow keys to

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Will the 4DX2-66
Family PC testify
against Sheryl?



*Furs pictured are made from artificial materials.

Setting: Lawyer's Office

Characters:

Jonathan Mattison: Lawyer

Kiki: Young wife of Victor

Victor: Kiki's husband
who was presumed dead

**Featured Gateway 2000 PC:
P5-100XL with the
new TelePath IIv fax/modem,
1GB hard drive and quad-speed
CD-ROM at a new low
price of \$3,799!**

After the reading of the will, Kiki and Mr. Mattison lock in a passionate embrace. However, they're unaware that Victor wasn't killed in the accident, and he has just arrived in Gateville.

Victor: Kiki! What's going on here? Unhand her, you beast! I thought you really loved me. Kiki! Now Anna tells me you're having an affair with my lawyer and you plotted to kill me just so you could get my beloved Gateway 2000® PC!

Kiki: Why Victor! I thought you were dead! Anna lied! Victor you have to believe me. Of course I would love to have this potent PC with its powerful Intel® 100MHz Pentium™ processor, whopping 1GB hard drive, new TelePath™ IIv fax/modem, 16MB of RAM, ultra-fast quad-speed CD-ROM drive, ACS-31 speakers with heart-pounding stereo sound, 17-inch Vivitron™ color monitor, and Microsoft® Office Professional, Bookshelf® and Money (*inhale*) all to myself. But at its new low price of only \$3,799 I could have easily bought it with my monthly allowance. Victor, your fall was an accident! We couldn't find you! We thought you were dead! It's been a whole week since you died. I thought it would be okay if I started dating again. I have needs, you know.

Victor: It was no accident! Some burly guy wearing a ski mask and a shiny three-piece suit shoved me off the cliff.

Mattison: Cool it Victor. Kiki and I had nothing to do with your accident. Anna bribed me to read the will. Man, was she steamed that you willed the P5-100XL to Kiki and she only got Fifi, the Yorkie.

Kiki: Yes Victor, I'm sure Anna hired the hit man.

Victor: This is terrible. To think my own daughter would have me killed. I must go rescue Fifi. And as for you two, I'll have you know Kiki, Mattison is your long lost twin brother! It would have only been a matter of time before you found out through the Internet.

Mattison: Now that you mention it, I do see a resemblance . . .

Kiki: (*faints*)



GATEWAY2000

"You've got a friend in the business."

8 0 0 - 8 4 6 - 2 0 6 3

Setting: Collapsed Office Building

Characters:

Julia: Successful Realtor

Trevor: Sexy Construction Worker

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The P5-75 Family PC with the
new TelePath IIv fax/modem,
2MB of video memory
and quad-speed CD-ROM
for only \$2,299!**

Julia and Trevor are lovers trapped in a collapsed office building. They could easily call for help with the PC's TelePath™ IIv fax/modem, but at the moment neither are in a hurry to be rescued. Julia is frisky, but Trevor's obsessed with her Gateway 2000® PC.

Julia: Trevor! How could you do this to me? You haven't paid any attention to me ever since we discovered my Gateway 2000 P5-75 Family PC™ multimedia system. Are you forgetting about our love child? Come on! Love in the rubble awaits us!

Trevor: Not now Julia! I've just discovered even more bodacious features on this PC! She has a hot new TelePath IIv fax/modem with a Messaging Center. We could really use her out at the construction site. She receives, plays and saves voice messages and even lets you access your computer remotely and check for new voice messages. The Messaging Center can send faxes from any Windows™ application that uses a print command and faxes can also be displayed, manipulated and edited, plus a ton of other really cool stuff!

Julia: Trevor, I never knew you were such a geek! Here we are, totally cut off from the rest of the world — it's the perfect time for love. Come to me you stud muffin!

Trevor: Hot damn! This PC is a beaut! She's been souped up with an ultra-fast quad-speed CD-ROM drive and 2MB of video memory — it's faster than grease lightning and a great value at only \$2,299!

Julia: Why Trevor, you've made quite a discovery. These new features plus the powerful Pentium™ processor, an immense 730MB hard drive, 15-inch Vivitron™ monitor, 16-bit sound card and Altec speakers are remarkable. But if you don't get those rugged hands off that PC now, you'll regret it!

Trevor: We have to get out of here! I'll use the modem on the TelePath IIv fax/modem to call for help. I have to get to a phone to order an anchovy pizza and a PC from Gateway 2000! I need to ask how Bob's doing, too. Gateway is such a great company! I can't wait to get my own PC. I'll get a 30-day money-back guarantee and a three-year warranty on parts for my desktop PC and monitor. Gateway will provide me with technical support for the life of my PC, and on-site service is available during the first year in most U.S. locations. They'll even send me a free written copy of their warranty if I request it.

Julia: That's it! You'll need your own PC because this one is history!

Trevor: Stop! How could you even think of destroying this incredible machine?

Julia: Trevor, my biological clock is ticking. This may be our last chance! We can fax for help afterwards and then you can order your own Gateway PC.

Trevor: Geez ... Julia. Okay, but you're kinda a mess.



GATEWAY2000

"You've got to find it in the machine."

8 0 0 - 8 4 6 - 2 0 6 3



pentium
PROCESSOR





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4DX2-66 Family PC multimedia
system with a double-speed CD-ROM,
new TelePath IIv fax/modem and six
exciting Microsoft software
applications for \$1,799!**

Setting: A fancy living room in a
stately home.

Characters:

Dirk: A debonair businessman

Sheryl: Simone's evil twin sister

*Dirk was enjoying a cocktail when he suddenly sensed something
was terribly wrong. At the same moment, his wife suddenly whips off a wig
revealing that she's Simone's evil twin sister.*

Dirk: Sheryl what have you done to me! Where is Simone?

Sheryl: Simone is gone Dirk. Just like you'll be in a few seconds. I poisoned your martini. I
want your Gateway 2000® 4DX2-66 Family PC™ multimedia system for myself. Simone always
had everything. Flowing auburn hair, a rich husband and a PC that she didn't even appreciate. I
desperately need this PC for my eight children. With Microsoft® Encarta™ '95, Penelope will
flourish in her studies at the Gateville Junior Academy, and Polly can develop her budding creative
talents with MS Fine Artist. Chester can track his stocks with MS Money, and Carlton can use the
spreadsheet in MS Works to track his pet iguana's feedings. The rest of the kids can check out
movies on MS Cinemania® '95 and sharpen their golf game with MS Golf. The 4DX2-66 will
prepare them well for Gateville's competitive job market. If my plan works they'll all support me by
the year 2005.

Dirk: You offed Simone?! Why didn't you tell me? I've always loved you. Simone was a raging
hypochondriac. She drove me nuts! Quick, get me an antidote. We'll live happily ever after together!

Sheryl: You love *me*? Maybe Simone sensed it and that was why she always said she was me.

Dirk: Sheryl, the antidote, please! I'll give you anything you want. I'll come live with you in Canada!

Sheryl: Oh how sweet. But would we be able to stay in contact with Gateway 2000?

Dirk: Of course! Gateway customers in Canada and Puerto Rico get toll-free telephone service along
with technical support. Plus, Gateway has a non-resident importer plan with Canada for easy delivery, and
on-site service is available in some Canadian and Puerto Rican locations.

Sheryl: That's nice Dirk, but I'm afraid it's too late. I'm flattered by your offer, but I'd rather have this
4DX2-66 all to myself. Plus, I'll have this house and everything you own since I'm a dead ringer for
Simone with this wig. In fact, my eight kids are on a flight to Gateville as we speak.

Dirk: You forgot (*gasp*) one (*choke*) thing. I'm (*cough*) taking (*wheeze*) my Gateway (*choke*) customer
(*cough*) I.D. (*gasp*) to my grave! (*THUMP*)

Sheryl: AUUGH!



GATEWAY2000

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- PCI Local Bus Graphics with 1MB
- Quad-Speed CD-ROM Drive
- 16-Bit Sound Card & Altec Speakers
- TelePath IIv 14.4K Fax/Modem
- 3.5" Diskette Drive
- 15" Vivitron™ Color Monitor
- Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Works, Encarta '95, Money, Cinemania '95, Fine Artist & Golf
- 3-Year Limited Parts Warranty

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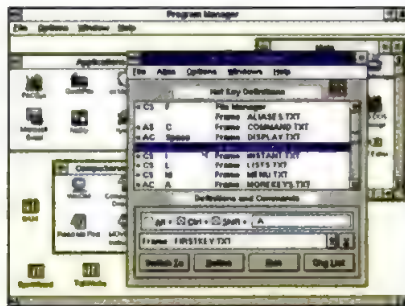
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SUITABILITY TO TASK

K-U-I

Power

Ease of Use

Desktop organization

FAIR

FAIR



SUITABILITY TO TASK

METZ Task Manager

Power

Ease of Use

Desktop organization

FAIR

GOOD

File finding

FAIR

GOOD

move a cursor around the screen.

K-U-I supplements but doesn't replace Program Manager. It's spiced up by a collection of screen savers and a few file-management options, but it's ultimately little more than a mild-mannered, keyboard-driven task manager. For mouseless installations or for the severely mouse-phobic, however, it represents a vast improvement over the Windows keyboard interface.

► **K-U-I, Version 1.1.** List price: \$39.95. Softac Corp., Winchester, MA; 617-721-1010.

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METZ Software Inc.

• METZ Task Manager

BY DEVAL SHAH

Launching applications, managing files, and monitoring your system are all made easier by the unobtrusive METZ Task Manager, Version 2.11 (\$49). As the name suggests, this is a Windows Task List replacement. You access METZ Task Manager the same way you access Windows' Task List: Double-clicking on the Windows desktop brings up its main module, a window containing a programmable button pad with 20 buttons for launching applications. Right-clicking on any button brings up a configuration dialog for assigning it to a Windows or DOS program; left-clicking launches the application. Hotkeys can perform the same task.

Other Task Manager features include a drop-down list of your Program Manager groups for quick access to programs and documents. A Run Area command line shows a command history for launching applications from the keyboard, a date

and time readout, and a monitor showing free disk space and system resources.

The Task Manager menu bar gives you access to a number of useful modules. A desktop configuration utility contains basic functions for tidying up your desktop; the Quick File Manager has a drag-and-drop-enabled window for copying, moving, renaming, and launching files; two search modules let you find files based on wildcards or a text string.

The Task Manager also lets you create a custom launch menu that it adds to File Manager's menu bar. You can add applications or define your own submenus via its Visual Basic-like menu builder.

METZ Task Manager's file and desktop management tools are easy to use, though decidedly on the light side. But the product concentrates on launching, and this it does very well.

► **METZ Task Manager, Version 2.11.** List price: \$49. METZ Software Inc., Bellevue, WA; 800-447-1712.

Circle 460 on reader service card

Symantec Corp.

• The Norton Desktop for Windows

BY BARRY SIMON

When it first appeared, The Norton Desktop for Windows (NDW) revolutionized the market for Windows utilities by showing how a product that significantly changes the look and feel of Windows can be a hit. The current version, 3.0 (\$179), includes an abundance of extra utilities—everything from backup to antivirus mea-

sures to a powerful batch language—that make it a veritable utilities superstore.

UNDER NEW MANAGEMENT

The basic desktop metaphor includes a feature popular in OS/2 and on the Mac that will also be in Windows 95: quick-launch icons on the desktop for managing unopened applications. To avoid confusion with icons that represent minimized running applications, NDW launch icons appear inside raised borders. Also on the desktop are icons for each drive; clicking on them launches the Norton File Manager for that drive.

Besides desktop launch buttons, NDW provides two other ways to launch applications: Quick Access and the Launch List. Quick Access can be configured as a Program Manager look-alike, and it is one of the few shells we saw that correctly implements Program Manager hotkeys and assigns launch icons to DOS applications when they are minimized on the desktop. But Quick Access's functions go way beyond those of Program Manager. It lets you nest groups, assign icons to closed groups, and configure any or all group windows as text lists or as toolboxes of launch buttons. You can also leave groups iconized on the desktop and assign password protection to items.

The Launch List is a configurable drop-down menu that you can access from the Control menu of any application containing frequently used items.

The centerpiece of NDW's file management system consists of Drive Windows that you open by clicking on the drive icons on the desktop. These provide standard select, copy, and move functions through drag-and-drop. The Drive Windows' View Pane lets you view files in many word processor, spreadsheet, database, and graphics formats; a stand-alone viewer is also provided. Compressed .ZIP files are shown on the directory tree as subdirectories with a distinct icon. Displaying a .ZIP subdirectory shows a list of the files in the .ZIP file. You can use the View Pane to view their contents, but you can't launch files from within .ZIPs.

The selection of viewers was adequate but not comprehensive. In testing, graphics viewers were occasionally problematic, supporting most of the important graphics

formats but not AutoCAD, CGM, .JPG, or Targa. One of our test .GIF files not only failed to display properly but consumed more than 10 percent of system resources in the process. One sample 24-bit .PCX file also displayed improperly.

NDW includes a SuperFind utility that can search your drive for mislaid files based on filename or text within files. On our informal tests, it performed very competitively on a timed text search.

HABIT-FORMING ADD-INS

One of NDW's most habit-forming add-ins is FileAssist, an optional enhancement to the Open and Save dialog boxes in any program that uses standard Windows dialogs. FileAssist adds buttons to call the file viewer, launch SuperFind, create a directory, and rename or delete a file. Highlighting any file in the list box shows file statistics such as date, time, and size.

Norton made its reputation with its disk utilities, and NDW has the best suite around. The sophisticated Norton Anti-Virus offers comprehensive detection, deletion, repair, and prevention. Norton Backup is an inclusive backup package that includes support for tape in both QIC and SCSI formats. The Norton Disk Doctor will check disks and fix any errors it finds. Speed Disk is an effective disk defragmenter that works under Windows.

NDW's automation tools are superb. Its ScriptMaker, a batch language com-

patible with Visual Basic, is coupled with an accurate macro recorder to get you started on writing complex automation scripts that can be compiled to executables. Another automation tool is Scheduler, which can perform tasks like backups or display messages at scheduled times. Other NDW extras include an ASCII editor with multilevel undo, an icon editor, several libraries of icons, a mini PIM, a screen saver, and a calculator with tape, financial, and scientific modes.

NDW provides compelling file launching and management and a needed facelift for the Windows interface. The few minor quirks in its viewers do little to detract from its great value overall.

► **The Norton Desktop for Windows, Version 3.0.** List price: \$179. Symantec Corp., Cupertino, CA; 800-441-7234.

Circle 461 on reader service card

Thoughtware Inc.

● OnTop

BY BARRY SIMON

Thoughtware's \$49.95 OnTop, Version 1.0, is named for the way it floats on top of your applications and at the top of your screen. But the program is so limited and takes such a big bite out of system resources that it winds up sinking close to the bottom of our list.

OnTop is the lightest of the light shells. It creates a command bar so narrow that even when your application is running full-screen, OnTop covers up only the application's title bar. Fortunately, the strip is narrow enough to let you get to your system menu and minimize or maximize buttons. If you need to see the title bar, a button will send OnTop to the bottom of your screen.

The OnTop command bar has buttons to exit Windows, a button to launch File Manager with the Search dialog open, a clock, and more. A drop-down launch list displays 13 windows and OnTop applets.

OnTop's Speed Launcher lets you pop up a five-row by two-column button palette whose buttons can be configured to launch Windows or DOS applications through a simple dialog. But OnTop offers no support for hotkeys, and the DOS applications it launches show the MS-DOS icons rather than the icons you as-



SUITABILITY TO TASK

	OnTop	
	Power	Ease of Use
Desktop organization	POOR	GOOD

sign to them on the OnTop palette.

Most users will find OnTop too limited. For example, you can have only ten launch buttons; the drop-down applet list can't be configured; and the resource monitor shows memory and system resources but not disk space. Yet the program hogs a big 13 percent of system resources. The application is also clearly designed to run at standard VGA resolution only. When we ran it at 1,024-by-768, we found that the right part of the OnTop command bar was cut off and the button that should send the bar to the bottom of the screen sent it to the middle, 480 pixels down! We feel you'd do better elsewhere.

► **OnTop, Version 1.0.** List price: \$49.95. Thoughtware Inc., Helen, GA; 706-865-9688.

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Central Point Software Inc.

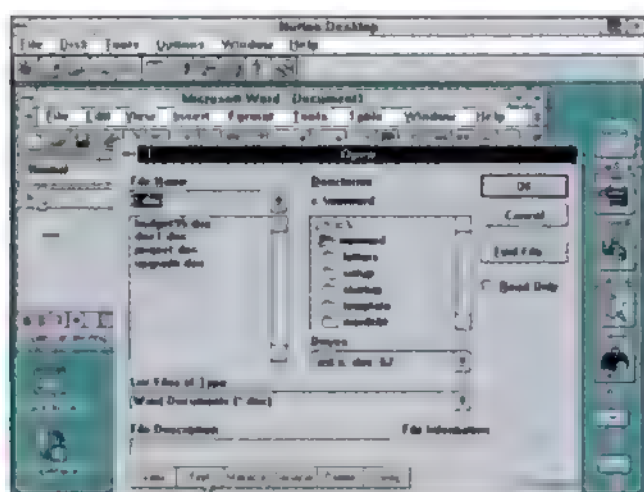
PC EDITORS' CHOICE PC Tools for Windows

BY BARRY SIMON

Central Point Software's \$179 PC Tools for Windows, Version 2.0, marries a top-notch shell to an excellent file manager and then adds a strong collection of disk and system utilities. The result is one of the most comprehensive suites in its category.

The PC Tools desktop provides a host of launch options and supports virtual desktops. Its shell supports nested subgroups and lets you display each group as an icon, a list of text and icons, a text list, or in a toolbox format. Launch icons, groups, and directory folders can be placed on any desktop for easy access. The Quick Launch menu, accessible from the system menu of the active application, also provides a fast path to launch items. Quick Launch is easy to set up because it is simply a group on the desktop. All you do is drag applications, groups, or documents to the Quick Launch group. The contents of each group appear as Quick Launch submenus under the group name.

The PC Tools MultiDesk lets you cre-



SUITABILITY TO TASK

The Norton Desktop for Windows

	Power	Ease of Use
Desktop organization	GOOD	GOOD
File management	GOOD	GOOD
File viewing	GOOD	GOOD
Automation	EXCELLENT	EXCELLENT
File finding	FAIR	EXCELLENT

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ate virtual desktops. Each can have its own wallpaper and hotkey for fast access. You can switch among them via a visual manager or from a drop-down list that PC Tools places in its title bar.

TOP-FLIGHT FILE MANAGEMENT

The PC Tools File Manager, one of the best available, is a version of XtreeGold for Windows (reviewed elsewhere in this

article). It offers customizable button bars and right-click menus, both of which let you access a lengthy assortment of file-management options. You can quickly sort lists of displayed files by filename, extension, type, size, date, or attributes simply by clicking on the appropriately labeled button above the listing.

Compressed files are supported transparently. They simply display as directory

listings showing the filenames contained in the compressed file. You can also view compressed files without an explicit decompression and even launch them. For example, double-clicking on a .DOC file inside a .ZIP file launches it in Microsoft Word for Windows. When you exit, the File Manager offers to update the version stored in the .ZIP file. PC Tools offers a good selection of file and graphics viewers

SHELLS, INTERFACE ENHANCEMENTS, FILE LAUNCHERS

Product	Company	Phone	Price	In short
Dashboard 2.0*	Borland International Inc. Scotts Valley, CA	800-533-0004	\$49.95	Dashboard, the slickest of the light shells, is a horizontal utility bar that sports pop-up launch lists, quick-launch buttons, and virtual desktops. It's even strong enough to be a Program Manager replacement.
Do-Over! 1.0a	Kansmen Corp. Milpitas, CA	800-200-9881	\$59.00	Do-Over! lets you dramatically revamp the appearance of all aspects of Windows, making any element bigger, bolder, and more garish. Novices will find that its launch bar, which resembles the Taskbar planned for Windows 95, makes application switching a breeze.
FrontRunner 1.03	Phar Lap Software Inc. Cambridge, MA	800-292-9622	\$139.00	FrontRunner provides a powerful command line interface for Windows users who still prefer the speed and efficiency of the DOS prompt. It also offers easy launching for Windows apps.
Hotwin 3.5	TMA Software Del Mar, CA	800-497-3617	\$49.95	Hotwin's cornucopia of add-ins includes a quick-access button on the current application's bar and the ability to tear off any menu as a floating toolbar. Nine virtual desktops let you spread your work out. The only downside is an unaesthetic graphical design.
K-U-I 1.1	Softac Corp. Winchester, MA	617-721-1010	\$39.95	K-U-I, a Task Manager replacement, lets you use Windows with hotkeys rather than mouse clicks. It also includes a command line, file management, and a mouse-simulation feature.
METZ Task Manager 2.11	METZ Software Inc. Bellevue, WA	800-447-1712	\$49.00	METZ Task Manager's strengths as an enhanced Task List lie in its 20 quick-launch buttons for applications. It also includes a Run box, a search utility, file management tools, and a resource monitor. METZ Task Manager is on the light side but easy to use.
The Norton Desktop for Windows 3.0	Symantec Corp. Cupertino, CA	800-441-7234	\$179.00	The huge Norton Desktop collection is a giant bundle of useful add-ins, including an enhanced shell and file manager, myriad viewers, the best set of disk utilities available, a powerful batch language, antivirus tools, and backup features.
OnTop 1.0	Thoughtware Inc. Helen, GA	706-865-9688	\$49.95	The least obtrusive launcher we saw, OnTop is an ultrathin strip about the size of a title bar. But its scant ten launch buttons, high system-resource usage, and problems running at high screen resolutions make it a poor choice.
PC Tools for Windows 2.0*	Central Point Software Inc. Beaverton, OR	800-964-6896	\$179.00	PC Tools shines with an ultraslick desktop, a virtual desktop manager, a system consultant, an icon editor, and a superb file manager. Its batch language and disk utilities don't match Norton's, but its strong core makes it the kitchen-sink utility of choice.
Plug-In for Windows 2.2	Plannet Crafters Inc. Alpharetta, GA	800-651-1000	\$20.00	Plug-In's substantial improvements to Program Manager include multiple routes for quick-launching applications, the ability to nest groups, and large icons. It's comparable to WindowMagic but offers more launching power.
Praxim 1.0*	Wesson International Inc. Austin, TX	800-634-9808	\$39.95	This versatile enhanced command line will delight DOS diehards, and the power of the Praxim Command Set will extend their reach. If you love your keyboard, this is a heavy hitter.
Salvation 1.2	Vitesse Inc. La Puente, CA	818-813-1270	\$20.00	Salvation offers a comprehensive, integrated replacement for both File and Program Manager in a single desktop. File-launching and -management functions are only a mouse click away.
SideBar for Windows 1.0	Quarterdeck Office Systems Inc. Santa Monica, CA	800-354-4757	\$59.95	SideBar provides nested folders, launchable desktop icons, and launching from file lists on a fully drag-and-drop-enabled desktop. But weak file management is the Achilles' heel of this otherwise nicely functioning shell.
SpinWizard 1.1.1a	Tanisys Technology Inc. Austin, TX	800-460-7746	\$79.95	SpinWizard offers quick access to up to 96 file applications and macros through macros placed on what looks like a rotating carousel. It's great for basic launching—but not much else.
TabWorks 1.1	XSoft (a division of Xerox Corp.) Palo Alto, CA	800-428-2995	\$49.00	A simple but effective shell based on a visual three-ring-binder metaphor, TabWorks is especially helpful to new users. Its unobtrusive on-screen task switcher lets you easily shuttle between files and applications.
Third Dimension 2.1	Lucid Corp. Richardson, TX	800-925-8243	\$49.95	Third Dimension, a Program Manager replacement, offers 20 tools that provide file and disk management, automated backup, a resource monitor, and several ways to dress up Windows. Its promise is offset by a complex interface and a few bugs.
ToolPAL 2.0	Digital Artistry Plano, TX	214-232-3310	\$34.95	The most flexible of the button-palette creation tools, ToolPAL uses buttons not just to launch applications but also to send menu commands to applications or paste in saved Clipboard contents. It is marred by rather terse documentation and on-line help.
WindowMagic 3.0	WinWear Inc. Bellevue, WA	800-803-9358	\$49.95	WindowMagic enhances Program Manager by letting you assign icons to closed Program Manager groups and pop up a launch menu of group items when you right-click on a closed group. Additional modules include a printer-driver manager and an enhanced Windows exit.
WinMaster 1.52	PC-Kwik Corp. Beaverton, OR	800-274-5945	\$129.00	WinMaster's strong suit is the ease of setting up toolboxes for launching applications or other toolboxes. Disk utilities round out the package. The only downside is the relatively high price.

*EDITORS' CHOICE

(although some were available only as free downloads for this review). They proved somewhat slow in testing, however.

The PC Tools desktop includes an optional panel called Crash Guard that displays free resources, memory, disk usage, date, and time. Other utilities include a full-featured disk diagnosis module called DiskFix, Central Point Anti-Virus, Central Point Backup, a disk defragmenter, and a module for creating an emergency disk. The slick System Consultant gives you a nice overview of your system's setup and resources, while its System Recommendations feature checks your setup and makes extensive tweaking suggestions. If the changes are to be made in an .INI file, the program offers to make the change for you on the spot.

FILE COMPANIONS

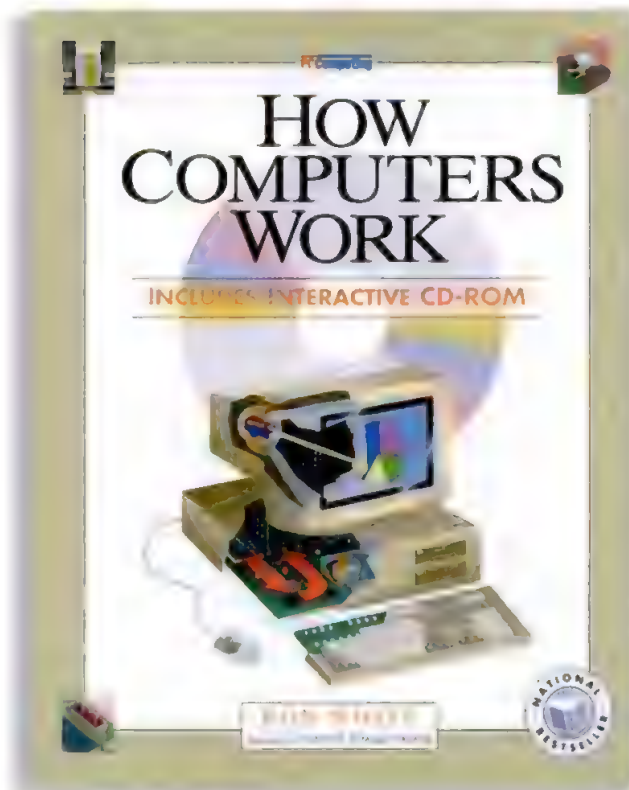
The PC Tools File Companions are small filing-cabinet icons that, when enabled, appear next to the system menu of the active application's Open and Save dialog boxes. Clicking on an icon lets you access a host of file- and disk-management functions including copy, move, rename, delete, compress, view, and create directory. But File Companions don't offer some of the features found in The Norton Utilities' FileAssist, including the latter's most-recently used list and file information panel. Unlike FileAssist, however, File Companions can be active in apps that



SUITABILITY TO TASK
PC Tools for Windows

	Power	Ease of Use
Desktop organization	EXCELLENT	GOOD
File management	EXCELLENT	EXCELLENT
File viewing	GOOD	GOOD
Automation	GOOD	GOOD
File finding	FAIR	EXCELLENT

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don't use Windows Common Dialogs.

PC Tools has a script language coupled with an effective macro-record capability and a dialog box editor. But the language comes up short when compared with NDW's ScriptMaker due to its proprietary syntax, lack of string-parsing functions, lack of real number support, and its inability to compile to a standalone executable.

Even so, PC Tools is a formidable competitor to The Norton Desktop. While the latter includes a more extensive collection of peripheral programs, PC Tools more than makes up for it with extra features in the core launching, desktop, and file-management modules. If that's what you're looking for, you definitely won't go wrong with PC Tools.

► **PC Tools for Windows, Version 2.0.** List price: \$179. Central Point Software Inc., Beaverton, OR; 800-964-6896.

Circle 463 on reader service card

Plannet Crafters Inc.

● Plug-In for Windows

BY BARRY SIMON

While Plug-In for Windows, Version 2.2—Plannet Crafters' \$20 shareware program—adds functions to any Windows shell, it really shines most as an enhancement to Program Manager. Its multiple-program launch mechanisms are easy to set up, and it includes many extras—from a slick system-reporting module to a variety of sounds you can assign to Windows events. In its default configuration, Plug-In uses only a modest 2 percent of the system resources.

The most visible change that Plug-In makes to Program Manager is that it lets

you assign custom icons to closed program groups. Plug-In also lets you nest Program Manager groups within other groups simply by dragging and dropping. If you right-click on a closed group, Plug-In displays a pop-up launch list of its contents, including any nested subgroups. Plug-In can also put lots of information in normally unused screen real estate on the left or right side of the title bar of the active application.

The most flexible launch method is Plug-In's QuickRun menu, which appears as a pull-down menu in Program Manager and is available from within any application via a button on the title bar or via a right-click on the Windows desktop. Setting up QuickRun is a breeze: You can import entire Program Manager groups or include a dynamic group as a submenu that changes as the group does.

One small glitch is that programs launched by Plug-In ignore hotkeys set within Program Manager. Another is that DOS programs it launches do not use the icon assigned in Program Manager.

Plug-In is attractively priced and will substantially enhance Program Manager's usability. It contains a number of features comparable to WinWear's WinMagic (also reviewed here) but offers more powerful launch menus.

► **Plug-In for Windows, Version 2.2.** List price: \$20. Plannet Crafters Inc., Alpharetta, GA; 800-651-1000.

Circle 464 on reader service card

Wesson International Inc.



BY BARRY SIMON

A command line is the core of Praxim, Release 1.0 (\$39.95), but it's the smartest command line you'll find for Windows. Not only does it change directories based on a partial name fit, but if you type in a command, it will search for a matching or partially matching name among the items in your Program Manager groups.

Praxim also places a variety of windows on the screen. One contains a set of convenient launch toolboxes that can launch programs, execute batch files, or run commands from the rich Praxim Command Set, an extension to standard DOS syntax. You can have toolboxes for

each Program Manager group or set up custom ones from scratch.

Another set of windows displays the results of DOS and Praxim commands. And the displayed output is intelligent: Right-clicking on a filename in a directory listing, for example, pops up a button palette containing applicable commands such as rename, copy, move, and type. Clicking on an executable file runs both DOS and Windows programs.

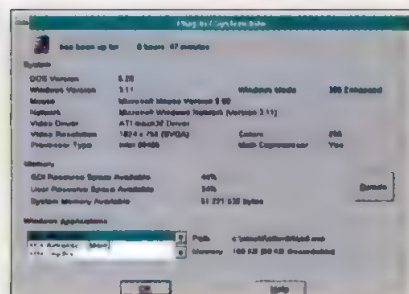
Praxim offers file management via a browse window with file and directory listings, although there is no support for compressed files and no file viewers other than the standard Type command. You can search for files using wildcards or a text string within a file. Praxim offers batch programming that goes beyond DOS in allowing string input and in the way it manipulates Praxim windows.

You can group sets of commands into a pop-up menu that you invoke at the command line. For easy access, you can assign hotkeys to the main Praxim command window, to toolboxes, and to individual toolbox commands.

Praxim uses about 10 percent of the system resources, but it's a heavy hitter that will be the favored choice for those who demand a command line interface to Windows.

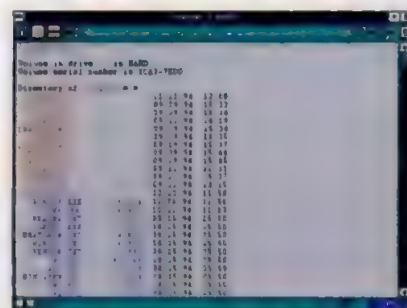
► **Praxim, Release 1.0.** List price: \$39.95. Wesson International Inc., Austin, TX; 800-634-9808.

Circle 465 on reader service card



SUITABILITY TO TASK
Plug-In for Windows

	Power	Ease of Use
Desktop organization	GOOD	EXCELLENT



SUITABILITY TO TASK

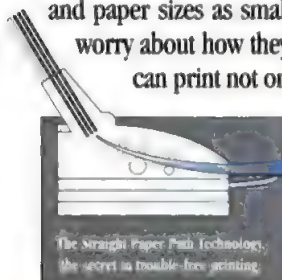
	Praxim	
	Power	Ease of Use
Desktop organization	GOOD	FAIR
File management	GOOD	FAIR
Automation	FAIR	FAIR
File finding	FAIR	GOOD

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CIRCLE 208 ON READER SERVICE CARD

Vitesse Inc.

● Salvation

BY DEVAL SHAH

Salvation, Version 1.2, from Vitesse (\$20), is a comprehensive replacement for the Windows shell. It offers file management, application launching, and miscellaneous utilities from a single, unified desktop.

Salvation organizes your applications and documents into Pages, each of which can contain up to 14 quick-launch buttons identified by their Program Manager icons and labels. Pages are selected from a drop-down menu and viewed one at a time. A conversion utility lets you automatically convert Program Manager groups to Pages. Individual launch buttons can also be programmed manually through a dialog brought up by right-clicking on the empty label field next to an unused button.

The Salvation desktop also gives you a graphical directory listing from which you can launch applications by double-clicking (you can't use it to program launch buttons on Pages via drag-and-drop, however). Small Mac-like icons next to the file listings help you visually distinguish between directories, executables, documents, help files, and even .DLLs. Right-clicking brings up the File Utilities window with tools for copying, moving, and comparing files, and creating or deleting directories.

A button on the desktop accesses a Find File utility that searches for files based on wildcards but not on a string

within a file. Additional utilities include a system information module, startup and file password protection, an undelete utility, and a clock. Standalone utilities include MicroLaunch, an enhanced Run utility that lets you browse a graphical listing of your disk contents, and SalvEdit, a basic text editor.

In its use of separate pages instead of folders or program groups, Salvation takes you in the opposite direction from many competing shells. But it is an easy-to-use low-cost alternative for managing files.

► **Salvation, Version 1.2.** List price: \$20. Vitesse Inc., La Puente, CA; 818-813-1270.

Circle 466 on reader service card

Quarterdeck Office Systems Inc.

● SideBar for Windows

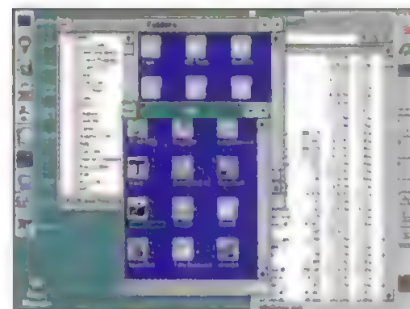
BY BARRY SIMON

If one phrase describes Quarterdeck's \$59.95 SideBar, Version 1.0, it's drag-and-drop functionality. No other Windows shell offers quite as much. You can drag programs from their default location on SideBar's IconBar or from any folder and place them on the desktop where they become shadows—that is, quick-launch icons that point to actual files.

Creating new folders for documents and applications is a simple matter of dragging a folder template off the IconBar. To add an extra drive icon to the desktop, just double-click on the IconBar's Drive List icon and drag the drive where you want it. All of this adds up to easy organization and easy launching, the product's greatest strength.

Some aspects of SideBar's interface resemble Microsoft Windows 95. Shadows are what Windows 95 calls Shortcuts. In both programs, these aliased items can be renamed just by clicking on the name and typing. Inside folders, SideBar can display a tree diagram of folders in outline form, a directory tree, or both, much like Windows 95's Explorer. Like Windows 95, SideBar exploits right-mouse-click menus and tabbed dialogs throughout.

While SideBar makes launching easy, its file-management options are very limited. It doesn't offer the search capability of File Manager and makes no attempt to address File Manager's biggest weakness, the lack of file viewers. The Copy, Move,



SUITABILITY TO TASK
SideBar for Windows

	Power	Ease of Use
Desktop organization	GOOD	EXCELLENT
File management	POOR	GOOD

and Rename dialogs are awkward; there isn't even a Browse button for filling in the target of a move or copy operation. Launchable items, whether in folders or on the desktop, can't be assigned hotkeys as Program Manager allows. Drive or Folder windows can display a command line for entering DOS commands or launching applications, but you can't drag filenames from the drive window to the command line. These drawbacks are more unfortunate in a program that handles basic launch tasks so well.

► **SideBar for Windows, Version 1.0.** List price: \$59.95. Quarterdeck Office Systems Inc., Santa Monica, CA; 800-354-4757.

Circle 467 on reader service card

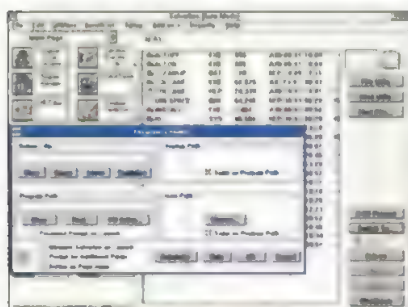
Tanisis Technology Inc.

● SpinWizard

BY ELISABETH HOLZER

SpinWizard, Version 1.1.1a, is an effective replacement for Program Manager groups via an unusual visual metaphor: an eight-sided cylindrical carousel that packs up to 96 items. By spinning the carousel with the mouse cursor or arrow keys, you can have point-and-click or function-key access to large numbers of programs, files, and SpinWizard macros in a small, tightly organized space. But while SpinWizard handles launch tasks well, its \$79.95 price is on the high side for a product with this narrow a focus.

Setup is a matter of dragging and dropping applications and files from File Manager or Program Manager into SpinWizard's cells, which are configured into



SUITABILITY TO TASK
Salvation

Desktop organization	FAIR	GOOD
File management	FAIR	FAIR
File viewing	POOR	FAIR

eight rows, each of which can hold up to 12 items. This process is partially automated since SpinWizard scans your program groups during installation and loads the applications it recognizes.

You can cut and paste the contents of one cell to another. In many cases, SpinWizard assigns the correct corresponding program icon to a file you place in a cell, but you can change icons with an icon browser that offers access to your hard disk and network. You can set SpinWizard to display on top of any other windows, or you can switch to it from anywhere within Windows (but not from Windows-based DOS sessions) with the Pause/Break key. SpinWizard offers a basic macro recorder but does not generate editable code.

SpinWizard's strength is its intuitive approach to file launching, and its ameni-



SUITABILITY TO TASK

	SpinWizard	
	Power	Ease of Use
Desktop organization	FAIR	EXCELLENT
Automation	POOR	EXCELLENT

ties are clearly focused in this direction. For example, indicator lights on each cell tell you whether the item is already running. If so, a Ctrl-Enter keystroke combination lets you launch a second session of the application.

SpinWizard makes no attempt to offer in-depth file management, viewers, or virtual desktop management, and those who need these features will want to look elsewhere. But if a well-designed substitute to Program Manager's launch and organization is needed, SpinWizard fits the bill.

► **SpinWizard, Version 1.1.1a.** List price: \$79.95. Tanisys Technology Inc., Austin, TX; 800-460-7746.

Circle 468 on reader service card

XSoft (Xerox Corp.)

• TabWorks

BY CADE METZ

XSoft's \$49 TabWorks, Version 1.1, uses a three-ring-binder metaphor as a simple but effective replacement for the Windows shell. All your files and applications are organized on accessible notebook pages grouped by labeled tabs. You can drag applications and documents from page to page or dock frequently used items on the ButtonStrip, a scrollable quick-launch bar at the edge of the notebook. A Holding Area serves as a convenient temporary home for docking icons. TabWorks' default installation fully replaces the Windows shell, and Task Manager creates tabs for all your Program Manager groups.

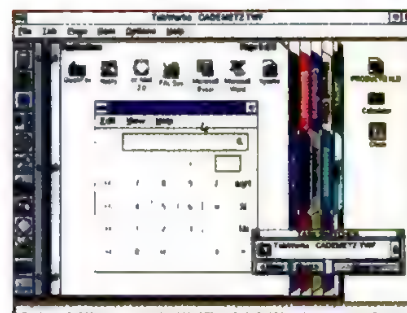
A table of contents page lists all items in the notebook under their tab heading, while an index lists them alphabetically. From either listing, you can jump to any tab or start any launchable item by double-clicking on the entry. Tabs, pages, file icons, and Windows application launch icons are all easily created, accessed, located, moved, or deleted. DOS applications and DOS files with File Manager associations can be dragged onto notebook pages and launched with a mouse click. As you create new files, TabWorks can be set to display a dialog prompting you to select a destination page. The program then creates a document icon on the target page with the correct application association.

TabWorks' task switcher offers an enhanced replacement for the Windows Task List. It provides a drop-down menu of all currently running tasks and buttons for toggling between them. TabWorks supports standard Windows hotkeys but does not provide viewers or augment File Manager's file-searching capabilities.

TabWorks should be familiar to many Compaq computer owners because Compaq has been bundling it with its systems for over a year. While it doesn't really extend Windows organizational features very far, it presents them in a new and intuitive light that may appeal to many users.

► **TabWorks, Version 1.1.** List price: \$49. XSoft (Xerox Corp.), Palo Alto, CA; 800-428-2995.

Circle 469 on reader service card



SUITABILITY TO TASK

	TabWorks	
	Power	Ease of Use
Desktop organization	FAIR	EXCELLENT

Lucid Corp.

• Third Dimension

BY ELISABETH HOLZER

A full-featured shell designed as a replacement for Program Manager, Third Dimension, Version 2.1 (\$49.95), offers file and disk management, automated backup, a resource monitor, and a number of ways to customize the look of Windows. But its interface seems unnecessarily complex, and it suffers from a few quirks and bugs.

First-time Windows users will appreciate Third Dimension's thorough and clear documentation but may find its interface more difficult to learn than Windows'. The program divides its basic functions among 20 separate tools that you access through a pull-down menu or a tool icon on the desktop. Third Dimension's chief organization tool is the aptly named Organizer, a program group that can contain drives, printers, tools, and other organizers, but not macros. Another tool, the File and Folder Manager, lets you create and open folders (directories) as well as copy, move, and delete files and objects.

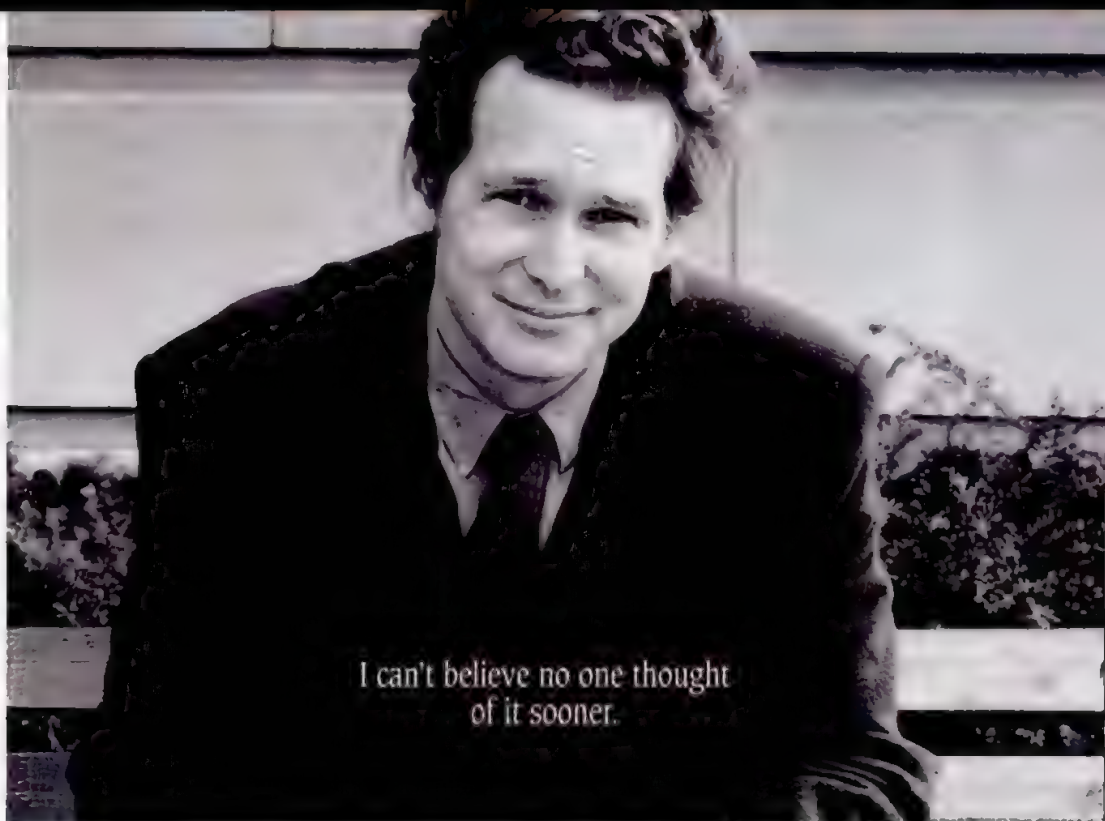
All users will appreciate Third Dimension's Windows-dressing abilities. You can customize the fonts in menus, dialog boxes, and buttons; add horizontal or vertical button bars to windows; and animate icons in association with specified actions.

However, we found that Third Dimension fell short in a few areas. It supports hotkeys only for Windows applications, and they override the hotkeys of many other applications. Password-protection features appeared functional but did not



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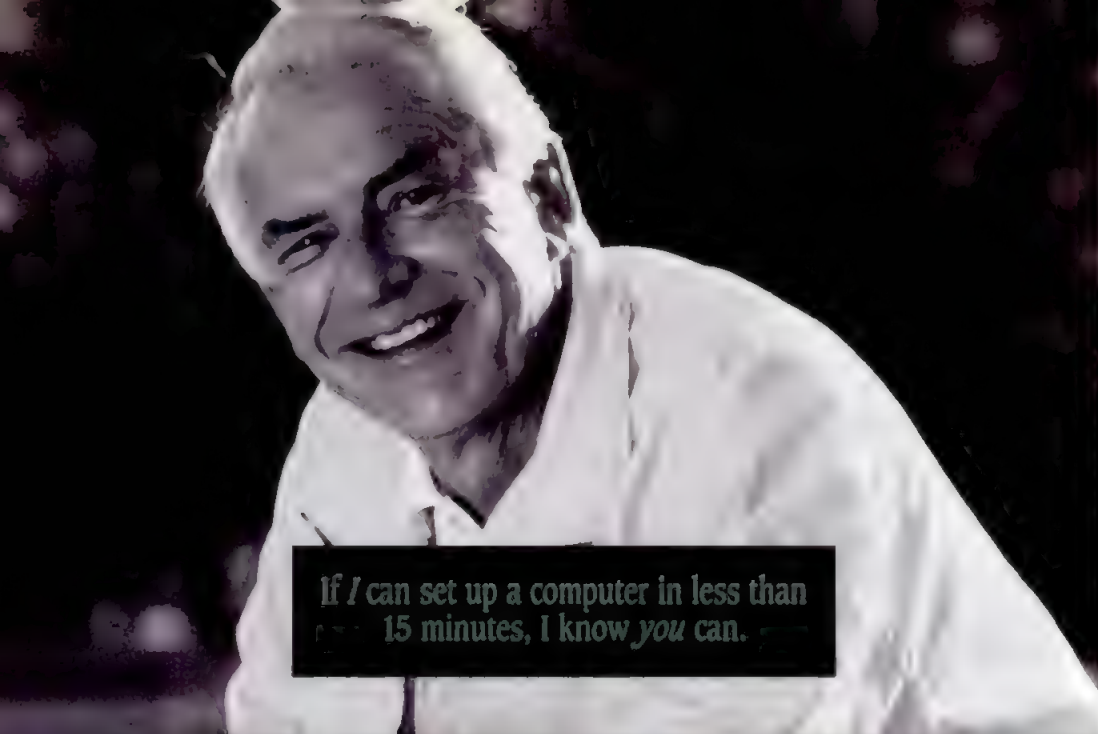


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PC Computing, Dec. 1994

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PC Magazine, Dec. 20, 1994

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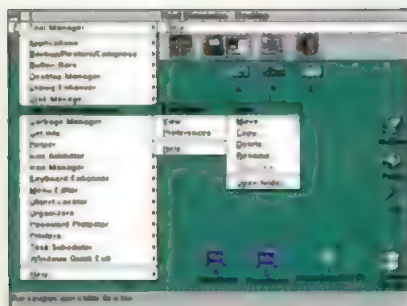
PC Magazine, Dec. 20, 1994

Acer



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CIRCLE 273 ON READER SERVICE CARD



SUITABILITY TO TASK

Third Dimension

	Power	Ease of Use
Desktop organization	GOOD	FAIR
File management	GOOD	FAIR
File finding	FAIR	FAIR

actually prevent access to protected files, a bug that Lucid acknowledges. The product also ignores some standard Windows conventions: Modal dialog boxes don't force you to respond, and you can drag-and-drop lines of text within a text list box. Lucid plans to fix these shortcomings in the next release. Overall, Third Dimen-

sion shows promise as a Program Manager substitute, but currently it seems to have as many problems as solutions.

► **Third Dimension, Version 2.1.** List price: \$49.95, Lucid Corp., Richardson, TX; 800-925-8243.

Circle 470 on reader service card

Digital Artistry

ToolPAL

BY BARRY SIMON

Digital Artistry's \$34.95 ToolPAL is the most complete tool-palette builder available for Windows. You can use it to create multitabbed, multibutton floating palettes that launch applications or documents, send commands to your programs, monitor system resources, and generally simplify a host of tasks. ToolPAL can set up your Program Manager groups as tabs automatically, and you can use ToolPAL's Window Manager module as your default task switcher. Palettes typically use a lean 3 percent of system resources.

ToolPAL's capabilities really stand out in the way palettes interact with applica-

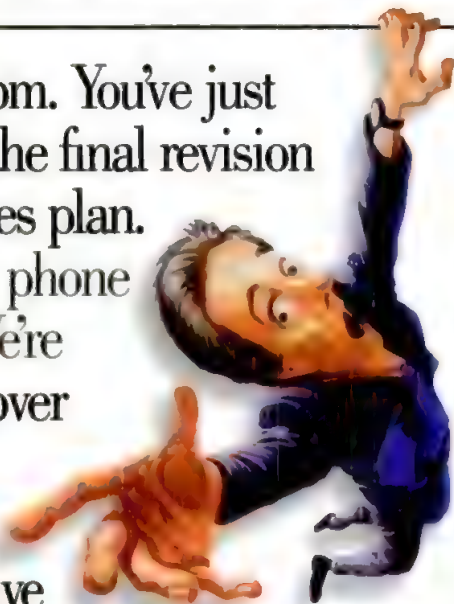
tions. ToolPAL can read the standard menus of running applications, making it possible to assign any menu item—Open or Paste, for example—to a palette button. This means that any application can have its own custom-made floating tool palette.

ToolPAL can also work magic with the Clipboard. You can store Clipboard contents in ToolPAL data files and then assign a button to write the data back to the Clipboard for pasting into the underlying application. This lets you place boilerplate elements in documents via ToolPAL buttons. You can even place a template containing variables into a ToolPAL clipboard button and prompt the user for a value when the button is run. ToolPAL includes a built-in resource monitor and a basic system-information report that can also be launched via buttons.

ToolPAL can provide up to nine virtual desktops, and you can set any of them to launch a given program. You can switch between desktops with ToolPAL buttons or through a pop-up menu accessed by right-clicking on any tool palette.

Unfortunately, ToolPAL's documenta-

It's 3:50 pm. You've just finished the final revision to the sales plan. Then the phone rings. "We're sending over 10 new pages of competitive info." Click. Good thing they lock the windows on this floor. You have to get it into the plan by the end of the day. What now?



You think she's finishing the proposal. She thinks you are. Surprise, neither one of you is. And it's 4 hours before the grant committee meets. Let's see, 16 new pages of data, 11 article reviews, 3,600 words sent by your partners in Istanbul. Who can type faster? What now?





SUITABILITY TO TASK

ToolPAL

	Power	Ease of Use
Desktop organization	FAIR	GOOD
Automation	FAIR	GOOD

tion is quite sparse, and the on-line help is not much better. This is a program you'll need to learn by experimentation. But if you do learn, you'll be rewarded with powerful button-based control over Windows. **► ToolPAL, Version 2.0.** List price: \$34.95. Digital Artistry, Plano, TX; 214-232-3310.

Circle 471 on reader service card

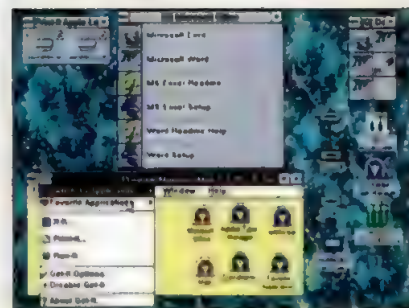
WinWear Inc.

• WindowMagic

BY BARRY SIMON

WinWear's \$49.95 WindowMagic, Version 3.0, has a Program Manager make-over at its core and a nice collection of miscellaneous utilities to round it out. The Program Manager add-in portion lets you assign icons to closed Program Manager groups, put shadows of closed groups on the desktop, and pop up a launch list of any group's contents by right-clicking on a closed group.

You can configure one item from each group as a quick-launch item that can be launched at any time simply by double-clicking on the closed group. You can also place the contents of any group on a free-floating button bar for easy access. WindowMagic places a Get-It button on the title bar that drops down a menu with a task switcher and a quick-launch list for the special Favorite Applications group it creates during installation. You can also add a date and time



SUITABILITY TO TASK

WindowMagic

	Power	Ease of Use
Desktop organization	GOOD	EXCELLENT

display to the active window's title bar.

WindowMagic comes with over 3,500 icons organized by subject into palette-style libraries. You can change the icon assigned to any Program Manager group or item simply by dragging a new icon from the palette and dropping it on the desired target. Depending on how many group icons you set, WindowMagic will take up from 2 to 5 percent of the free system resources.

The most powerful utility that

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WindowMagic includes is Print-It, a program that lets you switch printer drivers by simply clicking on a button. Print-It also lets you print often-printed files by using hotkeys. Among the other utilities are an enhanced Windows Exit dialog, a graphical memory and resource monitor, and drive icons that let you quickly launch File Manager for a specified drive or automatically launch installation programs. Many of WindowMagic's functions considerably overlap those of Plannet Crafters' Plug-In (also reviewed here). Some users will prefer Plug-In's powerful launch-menu capability, but those who love button bars will want to choose WindowMagic.

► **WindowMagic, Version 3.0.** List price: \$49.95. WinWear Inc., Bellevue, WA; 800-803-9358.

Circle 472 on reader service card

PC-Kwik Corp.

• WinMaster

BY BARRY SIMON

The central feature of PC-Kwik's WinMaster, Version 1.52, is Toolbox, a button-based launcher notable for its ease of configuration. But this \$129 package also includes a healthy selection

of utilities, including the Super PC-Kwik disk cache that established the company's reputation.

PC-Kwik toolboxes, which serve to launch applications or other toolboxes, can be set to float above the active application. Resizing a toolbox is as simple as grabbing the toolbox window's edge and dragging it. You can copy an entire Program Manager group to a toolbox, drag items from File Manager, or add buttons through a Browse dialog. WinMaster's Toolbox launcher will be especially attractive

to users faced with a resource crunch since they can use it as their Windows shell. It takes up only 3 percent of the system resources.

WinMaster's collection of add-on utilities includes KwikVault, an application that lets you archive files by dragging them from File Manager. Files are stored using compression technology from the makers of PKZIP, but not in a format that other .ZIP utilities can read.

The included Power Disk for Windows defragmenter is configured from Windows but runs from DOS, an approach that PC-Kwik feels is safer than running under Windows. The companion Power Disk Scheduler works by setting up a batch file that runs from your AUTO-EXEC.BAT file at boot-up.

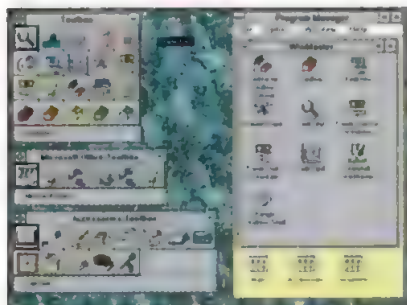
PowerScope, a powerful disk reporting utility, shows almost anything you'd want to know about disk usage. The efficient KwikFind will search for files based on filename or a text string and will let you launch or view the files found. WinMaster even includes a garbage-can-style file-deletion utility that can be used as a drag-and-drop target from File Manager. The selection of file viewers is adequate but not fully up to date.

Overall, WinMaster's toolbox launcher is useful and straightforward, and the disk utilities are an attractive bonus.

► **WinMaster, Version 1.52.** List price: \$129. PC-Kwik Corp., Beaverton, OR; 800-274-5945.

Circle 473 on reader service card

*You can copy an entire
Program Manager
group to a PC-Kwik
toolbox, drag items from
File Manager, or just
add buttons.*



SUITABILITY TO TASK

WinMaster

	Power	Ease of Use
Desktop organization	GOOD	GOOD
File management	FAIR	GOOD
File finding	FAIR	GOOD

FILE MANAGERS AND VIEWERS

Abacus Software Inc.

• BeckerTools

BY SHERYL CANTER

BeckerTools, Version 4.0 (\$129.95), from Abacus, is a set of 20 file and disk management utilities. Many are simply dialog boxes for common functions such as copy, and many are little more than duplicates of Windows applets. Others, such as Hex Editor and Icon Editor, are somewhat more useful. The detailed user manual is geared towards Windows novices.

Shell, the BeckerTools File Manager replacement, has a floating toolbar that provides access to BeckerTools utilities. Backup lets you back up files to floppy disks. The Disk Utilities let you change volume labels and format, compare, copy, and erase disks. File Finder lets you search for files based on filename or content. Disk Info presents a 3-D pie chart depicting disk space allocation. Launcher is a floating toolbar for launching applications.

The four BeckerTools editors—Text Editor, Icon Editor, Hex Editor, and Disk Editor—are nicely designed and simple to use, but Group Service, which takes over the Program Manager group functions, is much more complicated than Program Manager itself. File Compactor compresses Windows executables into a proprietary format, and File Extractor lets you execute these compressed files. Disk Librarian cre-



SUITABILITY TO TASK

BeckerTools

	Power	Ease of Use
File management	GOOD	GOOD
File viewing	POOR	GOOD
File finding	FAIR	GOOD



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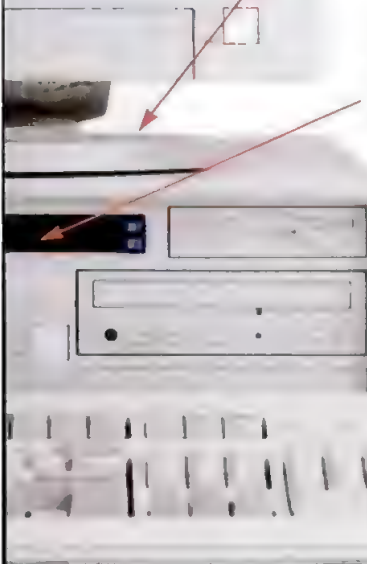


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ates archives in a proprietary format.

The supplied viewer recognizes only seven graphics formats (.BMP, .GIF, .IFF, .LBM, .PCX, .PIC, and TIFF) and plain text. All other files, including standard word processor and spreadsheet documents, must be viewed in hexadecimal. When we viewed a non-ASCII file as text, the display was corrupted. We also found a few quirks that occasionally prevented the display of graphics formats.

Power users will find little of interest in BeckerTools, but beginning Windows users may appreciate the additional help it offers.

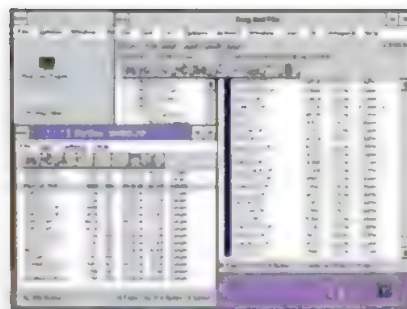
► **BeckerTools, Version 4.0.** List price: \$129.95. Abacus Software Inc., *Grand Rapids, MI*; 800-451-4319.
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Canyon Software

• Drag And File

BY SHERYL CANTER

Drag And File, Version 2.0 (\$69.95), offers a File Manager replacement (Drag And File), a compression utility (Drag And Zip), and a viewer (Drag And View), in addition to menu-driven format and copy utilities. It can also integrate



SUITABILITY TO TASK		
	Power	Ease of Use
File management	EXCELLENT	EXCELLENT
File viewing	FAIR	EXCELLENT

with Windows File Manager.

Drag And File looks very much like File Manager but contains numerous improvements; some subtle, some less so. For example, the New Window selection in File Manager opens an MDI child window. In Drag And File, it opens a completely separate window that is actually another instance of the program. Drag And File can perform operations such as copy and delete on all open Drag And File windows or just a single window. Another

way to open a drive window is via the Drive Bar, a strip of stay-on-top buttons for each disk. Drag And File's configurable toolbar is located just beneath the drive buttons. You can also display icons next to files for quicker recognizability.

The File menu's Multiassociate option lets you associate more than one program with an extension. When you launch a file of that type, a dialog box asks which program to use. Drag And File's search function, Find, can search multiple drives.

You open the viewer by dragging files onto it or selecting View from the Action menu. With the Autoview option, selected files are displayed automatically. The viewer can display text, many graphics formats, and some database and spreadsheet formats. But the text isn't formatted; you don't see boldface and italics; and you can't view embedded objects. The Drag And Zip utility has built-in compression or works as an interface to PKZIP. Drag And File loads a bit more slowly than File Manager, but its added features are practical and very easy to use.

► **Drag And File, Version 2.0.** List price: \$69.95. Canyon Software, *San Rafael, CA*; 800-280-3691.

Circle 475 on reader service card

• File Manager Makeovers

Ever wish File Manager had its own batch language, viewer, and uninstaller? Here are three utilities that provide these things and also add a whole range of functions—from searching for text within files to adding your own menus to easing software installation.

By Barry Simon

The Microsoft Windows File Manager offers special support for add-ins, and several of the products reviewed in this story, including The Norton Desktop from Symantec, Outside In/for Windows from Systems Compatibility, and Panoramic! from Cimmetry Systems, hook parts of themselves right into the File Manager environment. We also looked at three products that run entirely as File Manager add-ins: File Com-

mander from Wilson WindowWare, FileManager+ from WinWear, and WizManager from Mijenix Corp.

First, a word of warning about File Manager add-ins. Windows for Workgroups 3.11 supports only five simultaneous add-ins, and earlier Windows versions support only four. If you try to install more than that in your WINFILE.INI, only the first five (or four) are loaded. You'll need to remove add-ins by hand from WINFILE.INI if

you have too many and the ones you want are ignored.

File Commander, Version 2.0, gives File Manager the power of Wilson WindowWare's Windows Interface Language (WIL), the comprehensive macro language that forms the basis of the company's WinBatch product. In its default configuration, File Commander places four additions into WINFILE.INI to provide four extra menus on the File Manager menu bar. These are filled with useful functions for everything from calling PKZIP to launching the Windows Calculator. These menus are all implemented in WIL, so you can use the batch language to modify them or to add your own items. One of the menus that File Commander provides lets you load the menu scripts into the Windows Notepad

Keyword Office Technologies Ltd.

KEYview

BY SHERYL CANTER

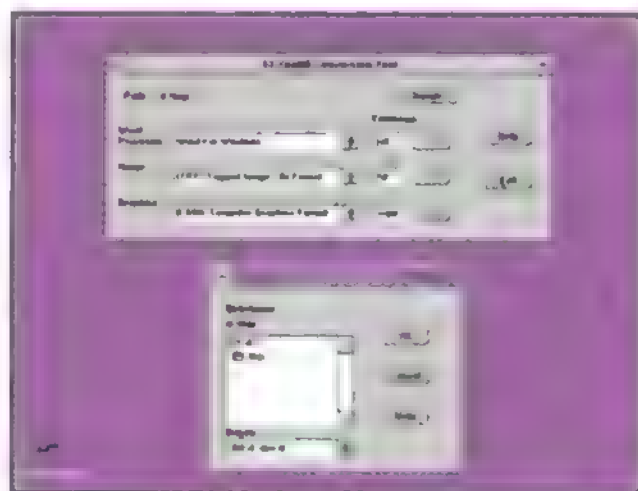
If you work in a multiplatform environment, you will appreciate KEYview, Version 4.1 (\$89), a powerful viewer utility from Keyword Office Technologies. In addition to handling DOS, Windows, and Macintosh files, KEYview supports Unix, Digital, Wang, and IBM mainframe formats. KEYpak Conversions, a batch-style conversion utility that lets you convert between formats, is available on many different platforms, but the viewer is currently available only for Windows.

You can launch KEYview from Program Manager or File Manager and integrate it with various e-mail programs. The

interface is simple but awkward. You can view a file by dragging it from File Manager onto the minimized KEYview icon, but to view another file, you must either minimize KEYview again and drag another file to it or use the File/Open menu item. This isn't difficult, but neither is it smooth. The 78-page KEYview manual is available only in electronic form.

Support for word processing and graphics files is very complete. KEYview can display embedded objects in word processing files and supports many formats. It has unique abilities in manipulating graphics views: You can zoom in and out and rotate the view in 90-degree increments. You can also

view more than one file at once. Graphics within spreadsheets are not displayed, however, and there is no support for database files.



SUITABILITY TO TASK

	KEYview	
	Power	Ease of Use
File management	FAIR	GOOD
File viewing	EXCELLENT	FAIR

for easy customization.

► List price: \$50 (shareware). Wilson WindowWare, Seattle, WA; 800-938-4601.

FileManager+, Version 2.0, extends Windows File Manager's function set with a command line and a customizable toolbar for launching a set of useful bundled utilities. These include a software installation dialog, an enhanced Task List, a Disk Duster for removing specified or duplicate files, PKZIP-compatible compression and decompression managers, and a utility for easy deletion and undeletion of files. The Disk-It feature lets you set alarms to monitor disk space. All of these features are also available from a drop-down menu that FileManager+ adds to the standard File Manager menu bar. All these utilities, in addition to an uninstaller, can be launched separately from the FileManager+ program group.

► List price: \$29.95. WinWear Inc., Bellevue, WA; 800-803-9358.

Wiz Manager, Version 2.0, turns File Manager into a powerful file manipulator. Wiz Manager includes a viewer that supports about 30 file formats. It also gives File Manager the ability to search for specified text within files.

Wiz Manager supports PKZIP compression and directory printing and lists space usage for each directory. The program also adds several ease-of-use enhancements. Over 60 File Manager and Wiz Manager functions are available through a button bar, and you can configure another button bar for quick-launching your applications. Both button bars also act as drag-and-drop targets. A right-button pop-up launch menu and a DOS command line are also provided.

► List price: \$40 (shareware). Mijenix Corp., Madison, WI; 608-277-1971.

Conversions, which work only with word processor and graphics files, are handled through a separate application. Like KEYview itself, the utility is simple to use but a bit awkward. You set the path for the converted file, select the conversion format, then minimize the utility and drag the source file onto the desktop icon from File Manager. Behind its rudimentary interface, KEYview packs a lot of power. If you need its unique features, KEYview is an excellent choice.

► **KEYview, Version 4.1.** List price: \$89. Keyword Office Technologies Ltd., Calgary, Alberta, Canada; 800-866-6539.

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Systems Compatibility Corp.



EDITORS' CHOICE

Outside In/for Windows

BY SHERYL CANTER

Outside In/for Windows, Version 2.1H, \$89 from Systems Compatibility Corp., is the most complete file viewer utility on the market today. Supporting 175 different file formats, it can be run as a standalone application, integrated with File Manager, launched from word processors such as WordPerfect, Ami Pro, and Word for Windows, or accessed from within five different e-mail applications to let you view attachments. With its File Find component, cut-and-paste facility, and utilities for moving, copying, deleting, launching, and printing files, Outside In can serve as a high-powered replacement for File Manager.

The core of Outside In is its viewers, which are superb. Not only is there a huge number of them, but the support for individual formats is especially rich. For example, you can seamlessly view OLE objects embedded in many word-processing files. Outside In supports a broad selection of word processors, spreadsheets, graphics, archives, presentations, and database files for DOS, Windows, and the Apple Macintosh. If you need to support some exotic format that Outside In lacks, you can add it yourself with the ViewAPI specification included with the product. In addition, commercial developers can license the viewer technology for inclusion in their own products.

Outside In displays directories and files on the left side of the screen and the file view on the right. You can print part or all

FILE MANAGERS AND VIEWERS

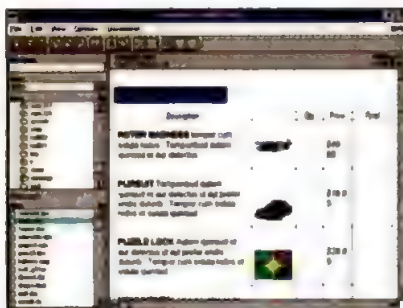
Product	Company	Phone	Price	In short
BeckerTools 4.0	Abacus Software Inc. Grand Rapids, MI	800-451-4319	\$129.95	This is a set of 20 utilities, mostly geared toward Windows novices. Many are simply dialog boxes to coach users through basic tasks, although a few are more powerful. Power users will find little of interest here.
Drag And File 2.0	Canyon Software San Rafael, CA	800-280-3691	\$69.95	Drag And File offers an enhanced replacement for Windows File Manager (Drag And File), a zip utility (Drag And Zip), a viewer (Drag And View), and menu-driven format and copy utilities. It loads more slowly than File Manager, but its added features are useful and easy to use.
KEYview 4.1	Keyword Office Technologies Ltd. Calgary, Alberta, Canada	800-866-6539	\$89.00	KEYview is unique among file viewers in its cross-platform support for word processing files, file conversion capability, and ability to manipulate graphics files. The interface is simple but a little awkward.
Outside In/for Windows 2.1H*	Systems Compatibility Corp Chicago, IL	800-333-1395	\$89.00	Here is a superb file viewer supporting 175 different file formats. Files can be viewed on-screen, printed, and copied using the Clipboard. Outside In can be launched as a stand alone application, integrated with File Manager, run from a word processor, or accessed from within e-mail applications to view attachments.
Panoramic! for Windows 1.1	Cimmetry Systems Inc. Cambridge, MA	800-361-1904	\$129.00	Panoramic! for Windows has an impressive feature set, but the features don't work well. The View utility is slow, some of our graphics files were distorted, and zipped files and embedded objects in Word for Windows files are not displayed. Consider looking elsewhere.
XTreeGold for Windows 4.0*	Central Point Software Inc Beaverton, OR	800-964-6896	\$99.95	XTreeGold for Windows offers virtually every imaginable file management utility, including a capable file viewer, a document-compare utility, a directory synchronizer, a powerful search facility, a compression utility, and more.

*EDITOR'S CHOICE

of a file and cut and paste formatted portions of it using the Windows Clipboard. After viewing a file, you can launch the application that created it (if you have it on your system) and edit the file. Functions are selected through menus or the toolbar; an Options menu lets you customize the way features work. Outside In also includes extensive on-line help in addition to its well-written manual. With its logical design and superb collection of viewers, this product is the finest in its class.

► **Outside In/for Windows, Version 2.1H.** List price: \$89. Systems Compatibility Corp., Chicago, IL; 800-333-1395.

Circle 477 on reader service card



SUITABILITY TO TASK
Outside In/for Windows

	Power	Ease of Use
Desktop organization	GOOD	EXCELLENT
File management	GOOD	EXCELLENT
File viewing	EXCELLENT	EXCELLENT
File finding	FAIR	EXCELLENT

Cimmetry Systems Inc.

► **Panoramic! for Windows**

BY SHERYL CANTER

Panoramic! for Windows, Version 1.1 (\$129), is one of the most expensive file viewers in this roundup but one of the least capable. Its features sound impressive, but many are awkward to use and some didn't work well in our testing.

Panoramic! has four components: View, Convert, Print, and File Listing. The View utility is exceedingly slow—many times slower than the other file viewers we saw. For some .EPS files, the display time was measured in minutes. Panoramic! also distorts some .PCX files and cannot view embedded objects in Microsoft Word for Windows files. Nor could we view zipped files: Either the file loaded and nothing was displayed or we received a sharing violation.

The Convert utility can create only graphics files, though the source file can be any type: word processor, spreadsheet, database, or graphic. Convert launches as a minimized icon; to open a window, drop a file on it from File Manager or from Panoramic!'s File Listing. The on-line help says you can also launch Convert by double-clicking on the minimized icon, but this didn't work in our testing. To launch Convert without dropping a file on it, you must select Open from its system menu.

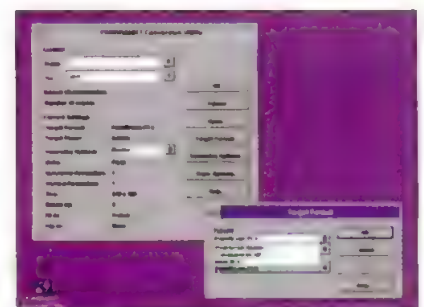
The Print utility is also launched mini-

mized. Files are printed by dragging and dropping them from the Windows or Panoramic! File Listing. This is the only way to open the Print utility; there is no Open selection on the System menu.

Panoramic!'s File Listing is a scaled-down version of Windows File Manager, offering a subset of its features. Since this feature can be added to File Manager's menu, the Panoramic! File Listing offers no real added value. In fact, the Panoramic! utilities are not available from within its own file manager. Panoramic! is a weak entrant in the Windows file viewer category. We recommend that you look elsewhere.

► **Panoramic! for Windows, Version 1.1.** List price: \$129. Cimmetry Systems Inc., Cambridge, MA; 800-361-1904.

Circle 478 on reader service card



SUITABILITY TO TASK
Panoramic! for Windows

	Power	Ease of Use
File management	POOR	GOOD
File viewing	POOR	GOOD







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Tips for optimum viewing:

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the image becomes clear.



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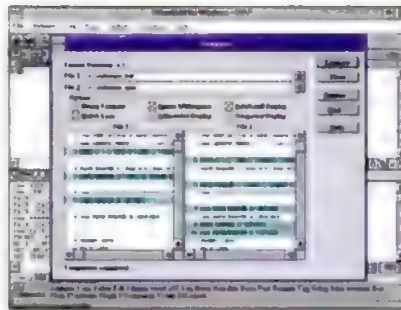
Central Point Software Inc.

PC EDITOR'S CHOICE
XTreeGold for Windows

BY SHERYL CANTER

When you first launch XTreeGold for Windows, Version 4.0 (\$99.95), you'll be presented with a complex display and a bewildering array of options. It can take a few minutes to sort out what you're seeing, but once you do, you'll find XTreeGold to be an extraordinarily powerful file-management tool. XTreeGold offers virtually every imaginable file-management utility, including all the features of Windows File Manager plus a capable file viewer, a document-compare utility, a directory synchronizer, a powerful search facility, a compression utility supporting six different formats, and much more. You can launch utilities from within XTreeGold or as standalone applications. Version 4 adds support for DOS keystrokes and long filenames.

The main XTreeGold window consists of side-by-side panes showing the directory structure on the left (with compressed archives included) and the files in the se-



SUITABILITY TO TASK

XTreeGold for Windows

	Power	Ease of Use
File management	EXCELLENT	GOOD
File viewing	GOOD	GOOD
File finding	FAIR	GOOD

lected directory or archive on the right. A ribbon along the top of the directory pane lets you control the depth of the display of the directory structure.

Opening the Viewer Pane lets you see the contents of any selected file, either in formatted or hexadecimal form. Files can also be printed. Because archives are included in the directory structure, you can view the contents of archives within

archives, an unusual capability. But you cannot view embedded objects within files as you can with more extensive viewers such as Outside In. Also, the XTreeGold viewer can't be integrated with other applications. But as a dedicated file and disk management utility, XTreeGold is matchless in the breadth and depth of its feature set. The time you spend up front to learn its capabilities will save you much time in future disk management tasks.

► **XTreeGold for Windows, Version 4.0.** List price: \$99.95. Central Point Software Inc., Beaverton, OR; 800-964-6896.

Circle 479 on reader service card

FILE FINDERS

Alki Software Corp.

• **Alki Seek 3.0 for Windows**

BY SHERYL CANTER

Alki Seek 3.0 for Windows (\$69.95) is a more capable product than its simple, unimposing interface suggests. It excels at both file and text searching, but some of its best features are squirreled away in unexpected places. To take full advantage of Seek, which was ported from the Macin-

• Zipping with a Friendly Face

By Barry Simon

Using compressed files to archive material is an old idea but still highly useful when it comes to storing related files or distributing software. While several compression formats are in use, the .ZIP format has become the de facto standard.

Unfortunately, PKZIP is a notoriously cryptic utility to use. A few general-purpose File Manager replacements, notably Drag And File, The Norton Desktop, Outside In/for Windows, PC Tools, and XTreeGold for Windows, offer a friendlier face for managing zipped archives, but if you don't have one of them, you'll benefit from a dedicated compression-aware Windows utility.

There is a raft of shareware and freeware offerings within this category, and we looked at three of the best—all available for downloading

from PC Magazine's CompuServe Forum (go PCMAGNET).

WinZip, Version 5.5a, is the Cadillac of unzippers. You can add to a zipped archive simply by dragging files from File Manager to the WinZip window. If you drag from the archive window to a drag-drop target, WinZip can unzip the file and pass the unzipped filename to the target. WinZip even has special features to cope with applications embedded in zipped archives. If a standard setup program is present, WinZip can install the program directly from the zipped file. After you've tried out the program, WinZip can even uninstall it by restoring your .INI files and generally cleaning up. For programs without a formal setup module, WinZip has a checkout feature that sets up a Program Manager group and again offers to remove the files and groups if you don't like the program.

► Registration fee: \$29. Nico Mak Computing, Bristol, CT; 800-242-4775 (filename: WINZIP.EXE).

ZipCenter, Version 1.01, a Windows front end used only for unzipping, requires you to have PKUNZIP, but it's well put together, and you can't beat the price.

► Registration fee: Free. Thomas Grubbe, San Jose, CA (filename: ZIPCTR.ZIP).

Zip Navigator, Version 2.01, like WinZip, supports drag-and-drop and has a checkout feature (but no automated install and uninstall). It does not require PKZIP, and supports such functions as printing and the testing of archive integrity, but at the cost of an interface that's more involved than WinZip's.

► Registration fee: \$49.50. FlashPoint Development, Houston, TX; 713-660-7240 (filename: ZIPNAV.EXE).

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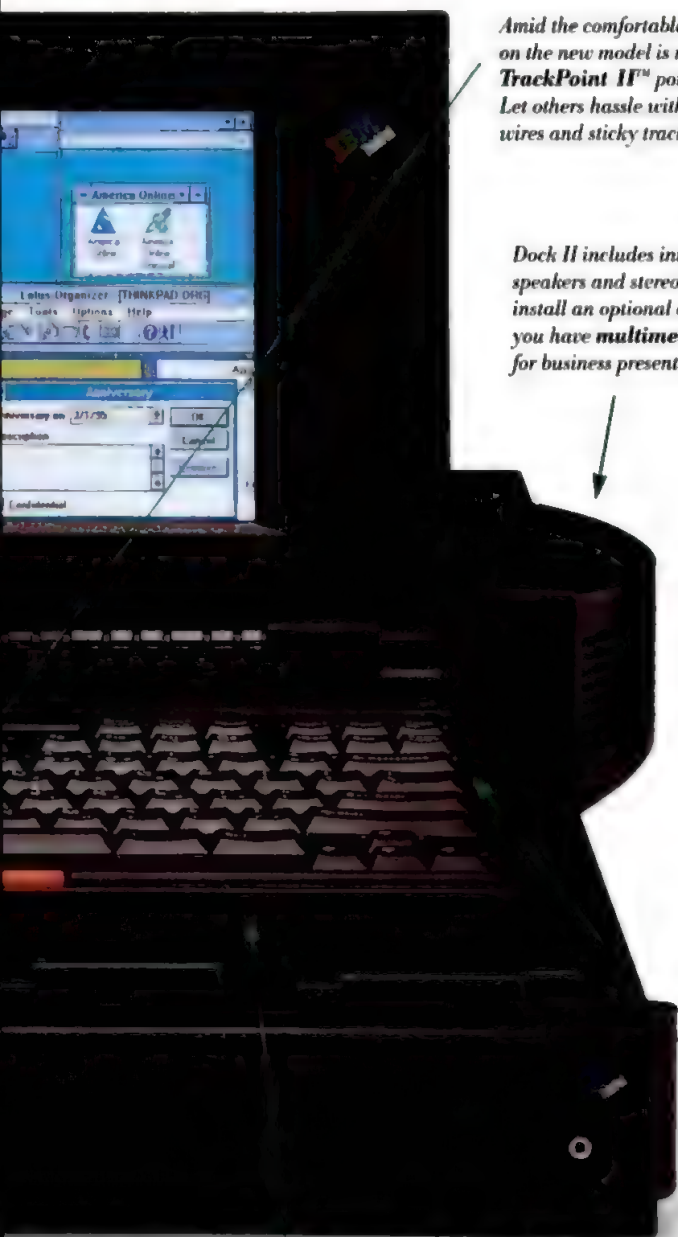
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Dock II\$710

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FILE FINDERS

Product	Company	Phone	Price	In short
Alki Seek 3.0 for Windows	Alki Software Corp. Seattle, WA	800-669-9673	\$69.95	Alki Seek's simple interface hides a powerful set of file- and text-searching features. Files can be found based on name, type, location, contents, date, size, attributes, or (for Microsoft Word and WordPerfect files) summary info. Content-searching options let you perform six types of searches: Contains, Grep Pattern, Boolean Pattern, Sounds Like, Similar, and DOS Pattern.
dtSearch 3.02	DT Software Inc. Arlington, VA	800-483-4637	\$149.00	dtSearch offers high-end text searching for a low-end price. The types of searches it can perform include indexed, nonindexed, combination, wildcard, proximity, fuzzy, phonetic, stemming, and more. A batch language lets you automate searching and indexing, and search results can be ordered by name, date, or number of hits.
Eclipse Find 1.02	Phoenix Technologies Ltd. Norwood, MA	800-452-0120	\$89.95	Eclipse Find has both file- and text-searching components but is stronger as a file finder. File content searches must use an index. High-end features such as proximity and fuzzy searches are not supported. Version 2.0, due out in early 1995, will add nonindexed searches.

tosh, be prepared to read the slim manual.

Seek supports both indexed and nonindexed searches, and you can narrow a search by restricting it to an existing result set. For simple searches, you just enter a filename or search string and click on Seek. Buttons along the bottom of the Seek window list more complex options. You can search by location, contents, file type, date, size, attributes, or (for Microsoft Word and WordPerfect files) summary information.

Probably the most complicated part of Seek is the Contents dialog box. You can use two search strings, separated by AND or OR. Sounds simple, but the strings themselves can be quite complex. There are six types of searches: Contains, Grep Pattern, Boolean Pattern, Sounds Like, Similar, and DOS Pattern. Boolean Pattern supports the operators NOT, AND, BEFORE, and NEAR. Sounds Like uses the Soundex phonetic matching algorithm and requires that you get the first letter right. A Choices button to the right of each string lets you set search options.

You can move, add, and delete items from the search results list, and you can save the list to a file. You can also use the list to move, copy, delete, or rename the files themselves. If you select Contents from the View menu, the contents of selected files are displayed to the right.

Alki Seek is deceptively simple in appearance; it takes some time to find all its features. But if you spend a little time with it, you'll be rewarded with a powerful search utility for a very low price.

► **Alki Seek 3.0 for Windows.** List price: \$69.95. Alki Software Corp., Seattle, WA; 800-669-9673.

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DT Software Inc.

• dtSearch

BY SHERYL CANTER

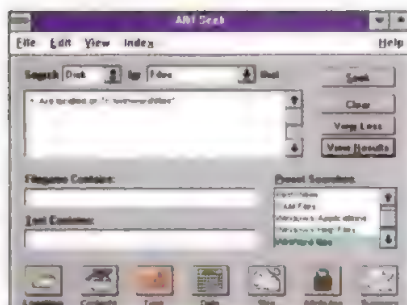
dtSearch, Version 3.02, provides industrial-strength text-searching capabilities for the very reasonable price of \$149. It can perform indexed, nonindexed, and combination searches, and supports wildcards, proximity searches, fuzzy searches, phonetic searches, stemming, and more. Its file-searching capabilities, however, are limited to filename and date, and its file-management tools are also limited: You can copy files, but you can't delete them.

Some portions of dtSearch were ported directly from the original DOS version and do not use Windows interface elements. For example, the Select Directories dialog box uses a nonstandard directory tree that isn't alphabetized. The interface isn't difficult to use, but it doesn't take full advantage of Windows. The company will address this in the next release.

Target directories for index creation are selected from the directory tree. If the files have an unrecognized format, you

can use a binary filter to strip off non-ASCII characters and index just the text. To search, you select the indexes or directories to use, enter the search criteria, and click OK. Batch language scripts, which can be generated from a dialog box, let you automate searching and indexing.

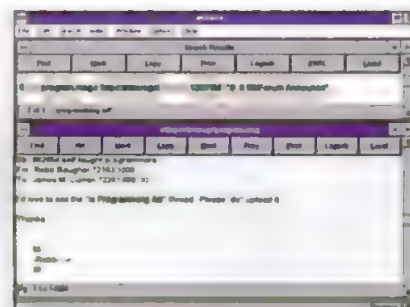
Search results can be ordered by name, date, or number of hits. You double-click on a file to view it. Files in .DBF format and most word processing files are recognized, but support is not complete; embedded images are not displayed. Repeatedly clicking the Hit button lets you scroll through every occurrence of the search criteria. You can create a printable search report that lists the filename and line number of each hit and shows the hit in context. Reports are hyperlinked to the original documents. dtSearch, a superb choice for full text searching, offers a multitude of high-end features for the price of a standard Windows utility.



SUITABILITY TO TASK

Alki Seek 3.0 for Windows

	Power	Ease of Use
File management	0000	0000
File viewing	FAIR	0000
File finding	EXCELLENT	0000



SUITABILITY TO TASK

dtSearch

	Power	Ease of Use
File management	FAIR	GOOD
File viewing	FAIR	FAIR
Automation	EXCELLENT	GOOD
File finding	EXCELLENT	EXCELLENT



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► **dtSearch, Version 3.02.** List price: \$149. DT Software Inc., Arlington, VA; 800-483-4637.

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Phoenix Technologies Ltd.

• Eclipse Find

BY SHERYL CANTER

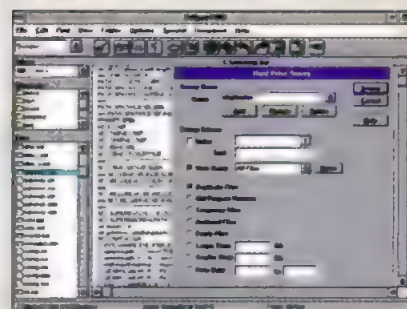
Eclipse Find, Version 1.02 (\$89.95), offers both file and text searching but is stronger as a file finder. Besides doing name searches, Find's Sweep facility can locate duplicate or empty files and outdated program versions. It can find files over or under a specified size or older or newer than a specified date. Find performs only indexed searches of file content, however; nonindexed searches are unavailable. You cannot search for phrases, and high-end features like proximity or fuzzy searches are not supported.

Find's interface is easy to navigate. Files are listed on the left, and their contents are displayed on the right. The viewers, licensed from Systems Compatibility Corp.'s Outside In, support a large variety

of formats. A Zoom option lets you view full file information, which is displayed in two modes: Browse Files, which lists your system's drives, directories, and files; and Search Results, which lists the files found in a search. You can save search results in folders for later handling. A compression feature lets you create PKZIP-compatible archives.

Only one index can be used in a search, but you can specify multiple sub-directories as targets for index creation, and you can include or exclude files according to their extensions. A check box tells Find to use the inclusion list; otherwise the exclusion list is used. But because the exclusions are under a separate menu item, it's easy to exclude files inadvertently.

Find's weakest function is managing files. You can't automatically jump to hits. You must perform a word search within each file, and there is no find-next facility. You can move, copy, delete, or rename files, but when you change the list, your place is lost when the list is rewritten. Eclipse Find is a capable file



SUITABILITY TO TASK

Eclipse Find		
	Power	Ease of Use
File management	FAIR	EXCELLENT
File viewing	EXCELLENT	EXCELLENT
File finding	GOOD	EXCELLENT

finder, but its text-search feature set is thin. Version 2.0, scheduled for release in the spring of 1995, will support nonindexed searches. □

► **Eclipse Find, Version 1.02.** List price: \$89.95. Phoenix Technologies Ltd., Norwood, MA; 800-452-0120.

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VIRTUAL REALITY

Virtually Here

Put on your stereoscopic glasses and take a look around. Affordable hardware and development kits are helping virtual reality get real (or should we say *unreal?*) on the PC.

By Linda and Erick Von Schweber

The world of computing is not flat but curved. Virtual reality takes you into the third dimension, a place of many more possibilities than you've seen through the flat glass of your monitor. You needn't be bound to the two-dimensional realm of the graphical user interface. The vehicles for exploration are available now.

Virtual-reality tools let you experience all kinds of "realities" without ever leaving your office. Imagine taking flying lessons without leaving the ground, practicing surgery without stepping into an operating room, or modeling data by grabbing it with your hand and moving it around in a 3-D space.

INTO THE THIRD DIMENSION

What is virtual reality (VR), and what is it not? After looking at and working with an enormous range of products, we've come up with a definition. *Virtual reality* lets you navigate and view a world of three dimensions in real time, with six degrees of freedom (6DOF). This represents the software's

ability to define—and the hardware's ability to recognize—six types of movement: forward/back, up/down, left/right, pitch up/down, angle left/right, and rotate left/right.

In essence, virtual reality is a clone of physical reality. In physical reality, you exist in three dimensions, experience real time, and have the ability to interact with the world



Programmable keyboard

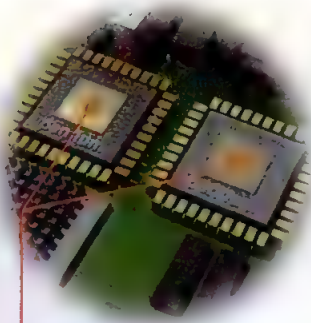
One hand is all you need to type in keyboard shortcuts here.

Keyboard

You'll still need it to provide standard input to your applications.

Three-button mouse

An affordable input device like this can be used to simulate six degrees of freedom (6DOF).

**Dual-Pentium processors**

For VR power, you need a system that can handle multiple graphics cards.

**Stereoscopic viewing**

With two graphics cards, your HMD can present you with a 3-D view.

Data glove

Use this to manipulate objects in the virtual environment.

Head-mounted display (HMD)

More than funky sunglasses, this lets you hear and see your world

Jackbox

A jackbox lets you connect your HMD with your NTSC converter, sound card, and input-device card.

NTSC pass-through connection

This will let you keep your monitor hooked up.

Tracking-device transmitter

This sends a signal to the tracker's sensors, which is then relayed back to the tracking device.

Tracking device

This uses sensors to find your position and orientation in space and sends that information to the PC.

Tracking-device sensors

You attach these position sensors to your body or VR hardware device, such as a data glove or HMD.

3-D graphics acceleration cards

These cards can render a virtual world with Gouraud-shaded shapes and extensive texture mapping.

3-D sound card

New sound cards let you receive sound that virtually surrounds you.

Serial interface card

If your PC lacks a game port, many desktop and hand-held input devices provide their own.

Hand-held input device

This joystick-like device lets you manipulate or control movement in your environment.

NOTE: For a wiring schematic of this diagram, see "Wired for VR."

around you. VR products mimic those conditions, even to the point where you can "touch" objects in a virtual world and have them respond or change according to your actions.

Interaction defines a VR experience, but interfacing enhances it. In VR's most basic form, you interface with a virtual world with your regular PC monitor, which serves as a win-

dow into that world. You can enhance your experience with additional technology that enables the virtual world to emerge from the screen into the room. And with a head-mounted display (HMD) or a CAVE (Cave Automatic Virtual Environment) as your visual interface, your view of the space around you is replaced by a virtual space that changes

as you move around. When you look up and see a virtual sky or look down and see virtual ground, you're immersed in virtual reality. If you use a CAVE, you can get a complete sense of immersion. You use projection devices to create surroundings that make it seem as if you're walking into an enclosed room; the walls and ceiling are used to surround you in a virtual world.

When you observe a user immersed in VR, the specialized equipment dominates your view. To the immersed user, however, all this hardware becomes invisible and plays a supporting role by enhancing the experience of freedom in the virtual space.

USING VR TODAY

Virtual space can simulate a real space or three-dimensional objects overlaid on the *real* world. An architect can easily allow a client to walk through the model of a proposed building in real time. The difference between this scenario and a traditional presentation shouldn't be taken lightly. In viewing blueprints, still renditions, or even a prerendered animation that flies through a model, the client's experience is totally passive. With VR, the presentation is interactive: The client drives the show and is an involved participant.

In virtual reality, an architect and a customer can configure a space together, dragging and dropping machinery, office equipment, and movable wall systems. They can even experiment with colors, textures, and lighting. This technique is applicable to retail and factory planning as well as general product and package design. With more sophisticated VR software, you can model machinery, vehicles, and devices, simulating the behavior of the actual equipment. This saves dollars and development cycles and lets you run training sessions with the virtual product.

What's really interesting is using VR dimensions to represent nonspatial quantities and qualities. vrTrader, a VR application available from Avatar Partners (800-307-3254), is one such package: It metaphorically turns financial data, stocks, markets, and trading activity into objects in 3-D

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space. vrTrader was built using Sense8's WorldToolKit. vrTrader's list price is normally \$495 but will be \$395 for an unspecified length of time.

VR is more than an enhancement for a few applications: It can lead to a better way

of computing. Operating systems and data structures that are currently based on two-dimensional files and folders will soon be based on 3-D objects. You won't just pop open folders—you'll walk through a virtual office and open virtual filing cabinets.

There isn't a wealth of PC-based VR applications available in this nascent category. What follows is a look at programming toolkits for building VR apps, and the hardware you'll need to experience them. The icons defined in "Virtual-Reality Dimensions," and used within the product category fact files, should help you match up complementary hardware and development tools. (For information on books about VR, see Read Only in this issue.)

VIRTUAL-REALITY SOFTWARE

World Builders

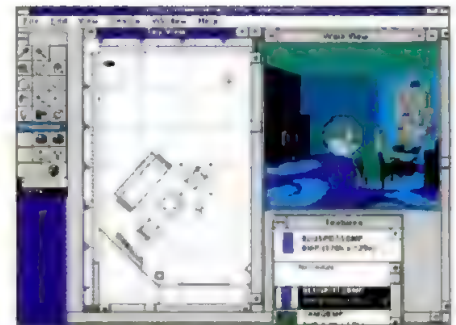
By Linda and Erick Von Schweber

To develop a VR application, you need the best tools for the program you want to build. Here we take a look at development products—from easiest to use to most complex—that provide 6DOF navigation with real-time rendering. Most testing was conducted on a 90-MHz Pentium-based Hewlett-Packard Vectra XU 5/90C with 32MB of RAM and a Matrox MGA Impression Plus PCI graphics accelerator.

VIRTUS VR AND VIRTUS WALKTHROUGH PRO

If you want a basic VR package, either for a fly-through application or just for getting your feet wet in VR, then Virtus WalkThrough Pro (\$495) and Virtus VR (\$99) are for you. Both Windows-based applications from Virtus share similar interfaces used for creating simple, flat-shaded virtual buildings, cities, and the like. Virtus VR offers fewer tools to create worlds, but both products can share the same 3-D object libraries.

Using Virtus WalkThrough Pro's Windows-based graphical interface, you can point and click your way to a world of



The Virtus WalkThrough Pro environment lets you see plan and perspective views of your VR world simultaneously.

your own. There are limits: There's no facility to import objects and there's no sound. The textures are only 256 colors and you can't communicate with other Windows applications.

If your needs are limited to creating and exploring a model of a house, building, or manufacturing or distribution facility, WalkThrough Pro is a good match. Its Windows point-and-click environment lets you keep any number of windows open simultaneously: A standard configuration uses a design-view window (with a view from the front, top, side, or bottom), and a walk window, in which you can fly through the three-dimensional rendered view. Icons are used for almost everything. You pick a shape, position and size it in

Our Contributors: LINDA AND ERICK VON SCHWEBER, principals of Infomaniacs, an Atlanta-based think tank, research quantum computing and have been exploring virtual reality as a new computing paradigm. BRAD EPRANIAN is a contributor to *PC Magazine*. LANCE ULANOFF was the associate editor in charge of this story, and JEFF MACE was the project leader.

the design-view window, and use an icon to connect it to another shape if you want, say, a doorway between them. The interface is not totally intuitive but it does present an accessible approach to 3-D design.

Everything you need for offices, homes, kitchens, bathrooms, and the like is included. We created a building of four connected hexagonal rooms in a few minutes and loaded furniture for offices, sitting areas, and a bathroom. We were able to apply wallpaper, install carpet, and change the colors and fabrics of furniture. Even creating doorways, roofs, and stairways is a breeze.

By deploying Virtus WalkThrough Pro in this development mode rather than in a runtime, you have partially reactive VR. You can work with a client to reconfigure the world, walk around it, and change it some more. The only problem here is cost—you need the full product. An extra package, the Virtus player, lets you freely distribute fly-through worlds on PCs, Macs, and PowerMacs. The Virtus player ships with Pro but not with Virtus VR; you can get it free from the company or download it from on-line services.

We built most of a four-room building with a 486/66 HP Vectra. Performance was quite good until we crashed the system with an excess of textures. The same file ran fine on the Pentium test system.

SUPERSCAPE VRT

The demos that come with Superscape VRT comprise a virtual doctoral program in VR interactivity. We explored Superscape VRT 3.6 for DOS (look for a Windows version in August 1995). It's a stand-alone system, containing tools for creating and editing worlds and objects; the company's procedural SCL language; a bitmap editor for textures; a sound editor for .WAV files; and, most amazingly, a built-in keyframe editor for producing animations and morphs. Also unique are the ability to specify ground, sky, and horizon colors and the inclusion of a ground/floor that you never fall off of and can edit easily.

More difficult to use than Virtus's offerings, Superscape's interface suffers from DOS-based clunkiness. It feels old, even though you're creating VR. The graphics tools are basic, and you may have trouble importing .DXF files. Most troubling, however, is the lighting methodology. You ac-

■ Virtual-Reality Dimensions

Different virtual-reality products support multiple types and levels of interaction. Use these descriptions and their associated icons to help you match development tools with VR peripherals.

Styles of Interactivity



FLY-THROUGH VR

Freedom to move, turn, and look in any direction in the virtual space. This is called six degrees of freedom (6DOF), and it is the defining characteristic of a VR system. An example is a walk-through of a CAD model. A system that provides less freedom of interaction may be useful, but it's not VR.



REACTIVE VR

All the freedom of fly-through VR with an added plus: When you interact with objects they will either respond with a predefined behavior or allow you to change them. Example: You can grab a three-dimensional object and send it flying, or you can pull on a 3-D object and change its shape.

Levels of Immersion



THROUGH THE WINDOW

A standard computer monitor or data projector provides a "window" into your virtual world that appears to lie on the other side of the screen. This is the experience you get from desktop flight-simulator games. In fact, this term originated with the first military-level flight simulators.



INTO THE ROOM

A stereo-ready monitor or projector displays a stereoscopic image and you wear what looks like a pair of sunglasses. The virtual world becomes quite dimensional, appears to recede into the monitor, and reaches out toward you, into your room. For a sample experience, don't miss the next 3-D movie that uses fancy polarized (not red/blue) glasses.



IMMERSIVE

When you put on a head-mounted display (HMD), you are transported into the virtual world (visually, at least). With head tracking, the computer knows and adjusts for your focal point. When you look up you see the virtual sky; when you look down you see the virtual ground.

tually have to assign color variants to an object for when its colors are lit and for when its colors are not lit. The end result is a very flat, limited visual quality.

Superscape does achieve impressive graphics performance on 486-based PCs if you have a graphics card with excellent DOS performance. Interaction is Superscape VRT's strong suit. Without having

to program, you can assign behaviors such as actions, rotations, gravity, and elasticity to objects. We built a room and placed a ball in it, and then it was easy to set things up so that when a user moved the ball it would begin to rotate, bounce all around the room, and slowly lose its bounce.

If you want a DOS product that doesn't

Fact Files: Software

Soon, VR applications won't be so much a luxury as a necessity for operating in tomorrow's business environment. We list the following products in the order in which they appear in our software evaluation. Note the icons, which reflect the type of VR outlined in "Virtual-Reality Dimensions."

Virtus VR Virtus Walkthrough Pro



List prices: VR, \$99, Walkthrough Pro, \$495
Virtus Corp., 919-467-9700, fax, 919-460-4530
Circle 495 on reader service card

Superscape VRT



List price: \$3,995 Superscape Inc., 415-812-9380, fax, 415-812-9390
Circle 496 on reader service card

VRCreator



List price: \$495 VREAM Inc., 312-477-0425, fax, 312-477-9702
Circle 497 on reader service card

WorldToolKit for Windows



List price: \$795 Sense8 Corp., 415-331-6318, fax, 415-331-9148
Circle 498 on reader service card

Open Inventor for Windows NT

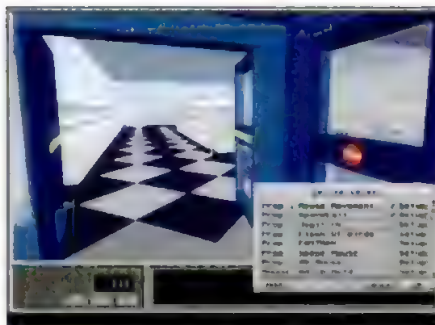


List price: \$1,395 NeTpower Inc., 800-801-0900, fax, 408-720-8558
Circle 499 on reader service card

Cyberspace Developer Kit



List price: \$1,995 Autodesk Inc., 800-525-2763, fax, 415-331-8093
Circle 500 on reader service card



Selecting input devices is easy, thanks to Superscape VRT's point-and-click interface.

require programming. Superscape VRT is the only choice. At \$3,995, it is robust and field-tested, relatively easy to use, and backed by people experienced in the designing and building of virtual worlds.

VRCreator

Instead of using a C or C++ programming language to build a VR world, VREAM's Windows-based VRCreator (unfinished at the time of our report; we looked at a prerelease version) provides tools to create 3-D objects and the ability to assign actions, reactions, and connections to them. All of this is accomplished largely without programming in the product's impressive new point-and-click interface. In addition to a new graphical interface (in Windows), VRCreator also features improved shading and textures thanks to RenderMorphics rendering.

We easily created 3-D objects using VRCreator's rich set of 3-D object creation tools, which include primitives, an extruder, and a lathe. Then we sized and positioned them, assigned textures, and modified lighting. Most impressive is the Link feature, which is used to connect objects, actions, and reactions. You open a Link dialog box, select an object or objects to link, select a condition, choose the object that will respond, select the response, and save the link. Simulating devices was never this simple.

VRCreator has retained its original scripting language to ensure compatibility with past versions. Though a boon to early adopters of VREAM's former DOS product, this language lacks the object orientation of its



In VRCreator, tools for object creation, properties, and behavior are grouped in a toolbar.

new interface.

How well does the new version of VRCreator exploit the strengths of Windows? It will support DDE, MCI, and OLE, as well as .WAV and MIDI files. Should the company achieve all this in a \$495 product, it will have brought multimedia into the third dimension. If you want VR power without the hassle of programming, VRCreator is the product to get.

WORLDTOOLKIT

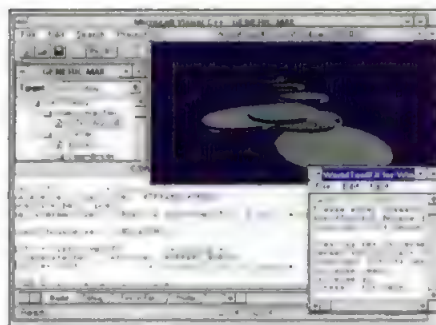
Sense8's WorldToolKit lets you do anything in VR. WorldToolKit programming tools run on many platforms, from DOS and Windows in all its variants to Unix on Digital, HP, IBM, SGI (Silicon Graphics Inc.), and Sun machines.

Sense8 supports nearly every VR interface device, including head mounts, trackers, 6DOF input devices, 3-D sound controllers, and the all-important graphics accelerators. Documentation is extensive and the company routinely configures systems and offers full consulting and contract development.

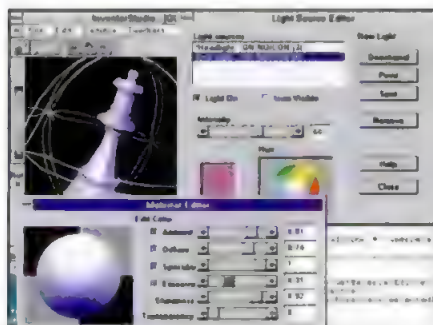
WorldToolKit consists of a library of C functions. You build your virtual world by writing code to call WorldToolKit functions. The development environment differs according to platform; for instance, in Windows NT you do development from within Visual C++. These function calls are used to initialize a world; import, size, or move an object; define behavior; add sensors to accept user input and detect user motion; and locate the user's viewpoint. You then compile and link. Sense8's function library is partially object-

FEATURES PLUS

From February 27 to March 3, you can go online to talk about virtual reality with authors from this story as well as industry experts. Type GO EXEC from any Compu-Serve! prompt.



WorldToolKit's source code shows how to program behaviors like elastic collisions.



Open Inventor's animation features are enhanced by its OpenGL support for materials.

oriented, but does not deliver all the productivity advantages of true object-oriented programming.

We examined WorldToolKit running on DOS, Windows 3.1, Windows NT 3.5, and two demos produced with a prerelease version of WorldToolKit, Version 2.1 for

Windows NT, accelerated by a prerelease Evans and Sutherland Freedom Graphics PCI board. One of the accelerated demos featured a completely textured environment with many objects moving and flying through it. We were able to move through the space at anywhere from 8 to 13 frames per second. This is impressive, as we have seen other vendors' systems crash when only loading highly textured worlds.

Tips and tricks are found throughout the user and reference manuals, and a hardware section familiarizes the reader with the full range of supported devices. Numerous demo apps are shipped with the product with complete source code. Studying these programs will show you how to link your virtual world to spreadsheet data in real time, provide the basics of implementing collision detection (to prevent the user from navigating through a wall), tell you how to animate objects in your world, and provide links between multiple worlds so the user can move among them.

Sense8 has another product coming: an object-oriented graphical IDE program for power users. It will use Microsoft Visual Basic as a scripting language so that, even while immersed, you can define or change an object's behavior dynamically by dragging Visual Basic code onto it.

If being prepared for all the possibilities is important for your application and organization, and programming talent is available, WorldToolKit is the world builder for you.

OPEN INVENTOR FOR WINDOWS NT

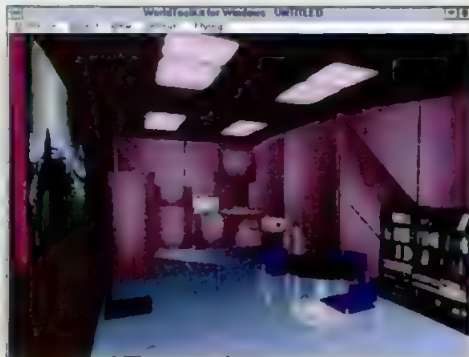
Open Inventor is an attempt to redefine the realm of interactive 3-D graphics. A C++ toolkit that is used from within Microsoft Visual C++ under Windows NT, it adds its own interface wizard to Visual C++. The wizard adds menu items and icons to your virtual-reality programs, which extends their functionality. It also provides object manipulators, which add wireframes around any object (in the runtime environment) and let the end user reshape, resize, and reposition any object in the world.

Open Inventor is actually just one version of a programming toolkit that SGI has

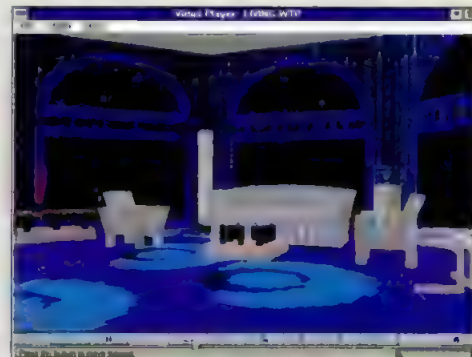
Welcome to Our World

These images show different views of the virtual corporation we created while testing our VR development tools. Our examples

show the development environments of Open Inventor, Virtus WalkThrough Pro, VRCreator, and WorldToolKit.



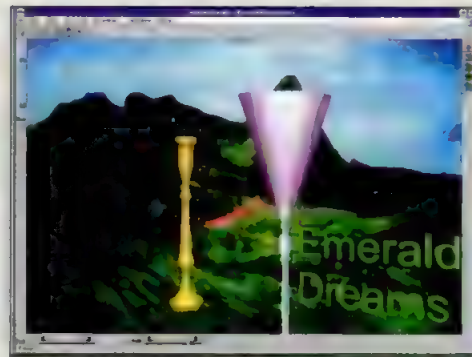
WorldToolKit features extensive use of textures, which you can see in the lounge in this image.



Produced in Virtus VR, this room proves that VR has advanced beyond its stick-figure beginnings.



VRCreator's Phong shading rounds and smooths the sharp edges of models with low polygon counts.



This kiosk, done in Open Inventor, shows the richness of hardware-accelerated texture mapping.

VR Development Tips

By Linda and Erick Von Schweber

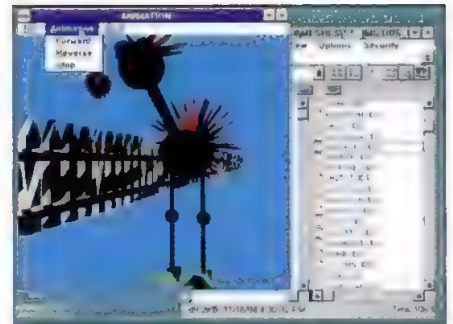
- ✓ Start with a description of the application you have in mind and its intended users.
- ✓ Characterize its style(s) of interactivity and level(s) of interface, allowing for future evolution.
- ✓ Compare that with the hardware, software, and sample configurations in this roundup.
- ✓ Have a list of products and vendors to accompany your description.
- ✓ Ask manufacturers of hardware to recommend compatible software.
- ✓ Ask software vendors to recommend coordinated hardware.
- ✓ After you've made your purchase(s), design carefully and don't try to add interactive object behaviors until you've created and imported objects, defined their attributes, and positioned them. Then add animation, lights, and viewports (cameras).
- ✓ Find a good 3-D object library to help populate your world. A wide array of 3-D clip models is available from Acuris (800-652-2874), Viewpoint DataLabs (800-328-2738), Syndesis Corp. (414-674-5200), Visual Software (818-883-7900), and Noumenon Labs (800-959-5227).
- ✓ Don't forget to count your polygons. Fewer polygons equals better performance.
- ✓ Objects in VR are more fun if they respond to interaction, or mutate.
- ✓ Add some animation and video. In a few cases, you can even import animations in 3D Studio file format.
- ✓ Add collision detection, elasticity, and gravity to objects, where possible, for more complex simulations.
- ✓ Remember, textures provide depth. Laying textures over objects and walls in your VR world will enhance the sense that your application is a real world.
- ✓ Remember, too many textures can slow down an application. Use them judiciously.
- ✓ Photo-realistic backgrounds can also enhance your world.
- ✓ VR worlds should be no more silent than your own. Many development environments support sound as well. Look for licensable collections of both MIDI and .WAV music, as well as sound effect collections.
- ✓ Fine-tune your world for better performance. Make objects invisible if they are hidden, or dynamically delete or replace objects depending on their visibility. Another technique is to reduce the detail rendered when the image is very far away.

licensed to a number of OEMs. NeTpower released the Windows NT version (examined here) in the fall of 1994. New platform releases should be shipping as you read this from Template Graphics Systems and Portable Graphics.

Open Inventor stores virtual world information in an object-oriented database called a scene graph. This elegant structure stores information for creating an animated, interactive, 3-D world. Such informa-

tion includes 3-D objects and their attributes, lighting, cameras, engines that provide motion and calculation, manipulators, events, shapes, and actions. Related to this database is a new file format with the extension .IV, called the Open Inventor Interchange Format. It lets you send interactive 3-D worlds across a LAN or around the Internet and run them on dissimilar computers.

The NeTpower port of Open Inventor



Cyberspace Developer Kit lets you bring in animation files and fly through your animation.

is flexible enough to support simulation, visualization, and VR. Once you understand the structure of the scene graph database, creating an application is as simple as writing a C++ program to populate the scene graph. You execute your program, it loads the database into memory, and your world is operational. No other program we looked at could even begin to approach the great design of this model. Open Inventor also provides an OpenGL rendering solution, as do workstation-level modeling and animation programs, to produce remarkably great-looking graphics. In addition to running Open Inventor on our test bed, we tried it out on an Intergraph TD-4, where it let us fly through beautifully rendered, complex scenes.

Although the NeTpower port ran without a hitch, it lacks a visual scene editor—a graphical window in which you interactively build your scene graph before refining it with C++. The Template Graphics port is expected to include this feature and a file format conversion utility, also lacking in the NeTpower port, to import and export non-IV files.

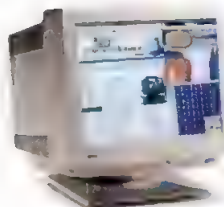
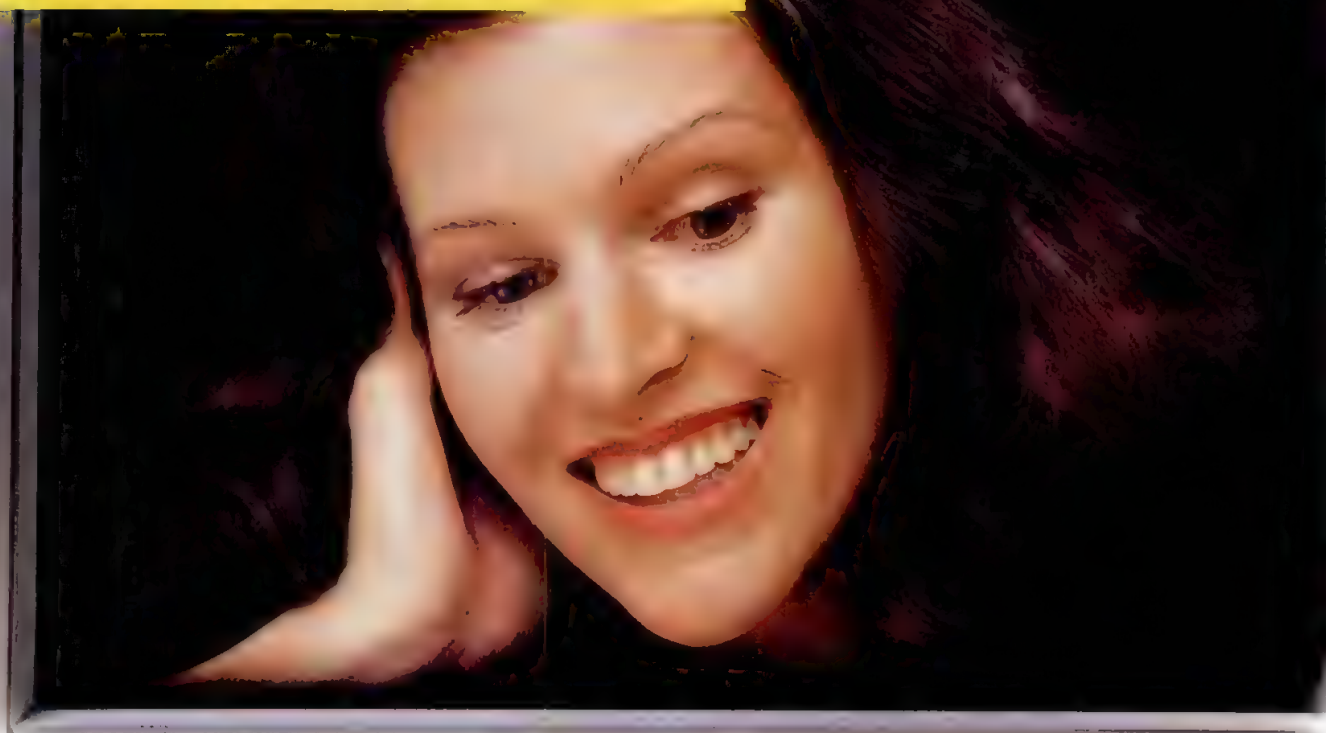
Open Inventor has some limitations. Global behaviors are not included in the model: You must either make them local to objects or look to another product. We are also not convinced that there is enough support for morphing of objects.

What's clear, though, is that because it is a highly portable and flexible standard, Open Inventor is soon to be the talk of the VR town.

CYBERSPACE DEVELOPER KIT

Autodesk's Cyberspace Developer Kit (CDK), Release 2.0, is a C++ programming toolkit providing C++ classes that you can use to create full-blown VR worlds, or to

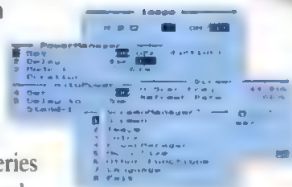
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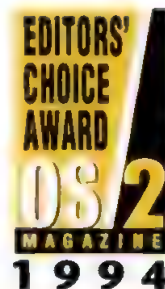
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add VR elements to your own prebuilt C++ programs. You develop in Windows NT and can execute in both Windows NT and Windows 3.1 with the Win32s and WinG extensions. You work and write code in Microsoft Visual C++; Autodesk hasn't added any wizards or other interface tools.

CDK can do some incredible things, but be prepared to write a lot of code. Just setting up the environment to render a static object requires pages of programming.

CDK is distinguished by its support for physics. Whether you need mass, gravity, springs, friction, or collisions, CDK provides a powerful set of primitives. To simulate additional Newtonian physics, you have workable support for matrix and vector algebra. The package is very useful to the game developer who wants to cre-

ate superrealistic motions of solid bodies in space.

Also of note is CDK's support for importing an animation produced in 3D Studio and running it in your virtual world as you navigate and interact. This is a great feature, since producing complex animations in a VR environment is typically not an easy task. In practice, the animation tended to slow down during navigation through our VR world, but generally we remained impressed.

Compared with the other toolkits we examined, CDK offers limited cross-platform support—basically Windows 3.1 and Windows NT. Still, if you love to program and can exploit CDK's strengths in physics and animation, as well as its flexible architecture, this may be the VR toolkit for you.

VIRTUAL-REALITY HARDWARE

Dressing for VR

By Brad Epranian

The degree to which you feel a part of your virtual world really depends on the hardware you use. Whether it's a headset, a glove, or an input device, the tool you choose will help you interact with VR software in a natural way. Here, we look at a wide range of hardware, starting with the PC subsystem (add-in cards), and moving through to traditional and nontraditional input devices such as special mice, gloves, and joysticks, and the equipment (helmets and glasses) that will let you see your world.

To date, price has been the greatest barrier to using these kinds of products. Some of the best VR systems remain proprietary and can cost as much as \$40,000 for a complete system (usually including a prebuilt application). That's beginning to change; you can find headsets and input devices for under \$1,000.

As we experimented, we used Intergraph Computer Systems Corp.'s TD-4, PC Video Conversion Corp.'s HyperConverter, and Forte Technologies' VFX1 HMS. We also used Sense8's WorldToolKit, Evans and Sutherland Computer Corp.'s Manor demo (which was written in WorldToolKit), DOOM, and Microsoft Word for Windows (to check readability of fonts). Whenever possible, we looked at shipping

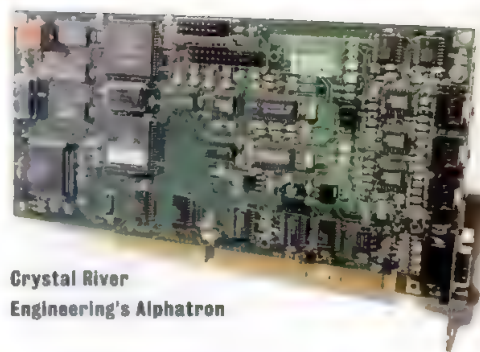
products, but some products were prototypes of upcoming releases.

3-D GRAPHICS

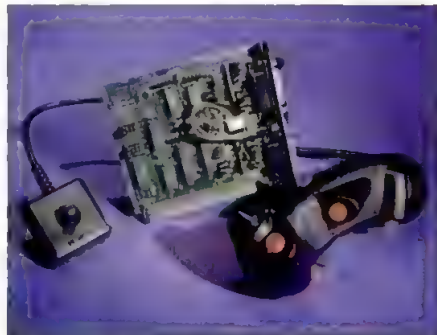
Even the simple graphics of the Windows environment can tax an average system. Just imagine what unassisted VR is like on a PC. Any viable PC-based VR system should start with a 3-D graphics accelerator card.

Matrox Graphics' **MGA Impression Lite** and **MGA Impression Plus** are the first low-cost rendering accelerators supporting Open GL, 3DR, Render Ware, Reality Lab, and Ithaca Software's HOOPS APIs. Starting at \$369 and \$449, respectively, these boards are bringing 3-D acceleration to the average desktop. Features include hardware support of Z-buffering, Gouraud shading, and double-buffering, plus complete 2-D Windows acceleration.

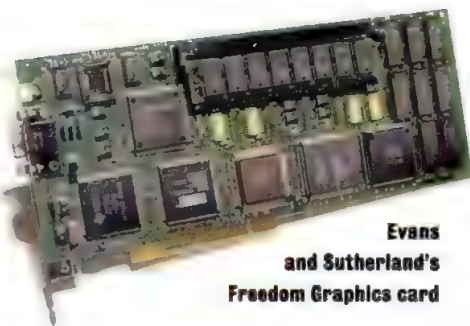
Evans and Sutherland Computer Corp.'s **Freedom Graphics** \$2,400 PCI-based 3-D graphics accelerator (which should be available by the time you read this) supports 24-bit- and alpha-channel textures to give a more realistic feel to your world. Other features include support for the OpenGL 3-D API, anti-aliased lines, translucent and transparent objects, Gour-



Crystal River
Engineering's Alphasron



InWorld VR's CyberWand



Evans
and Sutherland's
Freedom Graphics card



StereoGraphics' CrystalEyes PC

aud shading, and Z-buffering.

Future Visions Technologies' **Sapphire 2SX** (which should be shipping by the time you read this) is a wonderful new PCI-bus 3-D Windows accelerator for both Windows 3.1 and Windows NT 3.5. Based on 3D Labs' Glint chip, the Sapphire starts at

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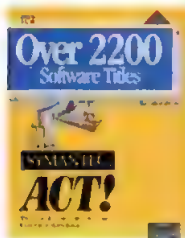
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Projected list price: \$2,400, includes 4MB VRAM and 4MB Z-buffer memory. Evans and Sutherland Computer Corp. 801-582-5847; fax, 801-582-0524.
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CrystalEyes CrystalEyes PC CrystalEyes VR



List prices: CrystalEyes PC, \$985; CrystalEyes, \$1,300; CrystalEyes VR, \$1,995. StereoGraphics Corp. 415-459-4500, fax, 415-459-3020
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List price: \$7,900. Virtual Research Systems Inc. 408-748-8712; fax, 408-748-8714.
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CIRCLE 211 ON READER SERVICE CARD

Virtual Reality in Business

By Linda and Erick Von Schweber

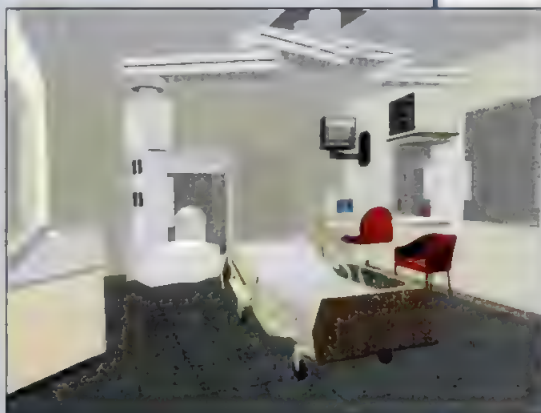
Although many people believe virtual reality will mostly result in better games, many corporations have seized upon it as a cheaper way to project the future, a more effective way to make sales, and a better way to train their employees.

What would it be like to travel into the future and step into a Burger King restaurant? (*Top image.*) Attendees at a recent National Burger King Franchisee show were able to don a pair of StereoGraphics' CrystalEyes and navigate the virtual restaurant of the future, inside and out, from the perspective of a customer or that of an employee. The world was built in VREAM and projected in true stereo.

In the world of medicine, while some doctors are performing virtual surgery, other physicians are entering VR to try out medical equipment. (*Middle image.*) AMSCO, a supplier of hospital decontamination and surgical equipment, is equipping its sales force with 486-based laptops that run Super-scape VRT. With AMSCO's line of equipment modeled in 3-D, a salesperson reproduces a customer's facility on the spot and then works in VR with a doctor to configure a workable equipment layout.

Doctors won't be the only ones doing their shopping in VR. Oracle Corp. is extending its Oracle Media Objects with Smart 3D, a VR technology from Macromedia. This enhancement takes consumers beyond a 2-D screen and lets them explore rich, fully realized environments through interactive TV. Smart 3D enables developers to populate a world with 3-D objects, such as characters; define physics, such as gravity; and assign behaviors through Lingo scripts, the language of Macromedia's Director.

How will education and training keep up with interactive 3-D TV? (*Bottom image.*) Andersen Consulting is using Sense8's WorldToolKit for



Windows to turn the complex concepts of its object modeling methodology into a virtual world that students can explore. Chuck Lau, director at Andersen Consulting Education, told us that VR is part of Andersen's Learn by Doing strategic initiative, which turns "passive observers into involved participants." □

3-D SOUND

Sound is one of the most important aspects of bringing life into any 3-D world. Does the helicopter above really sound as if it's passing over you? If you're in a large, virtual room, does the sound echo? Sound cards designed to work with toolkits that build VR worlds can give you the right aural experience.

Crystal River Engineering's ISA-based **Alphatron** (\$695) works with most VR world-building kits through a C API. When used in concert with any compatible 3D Space tracking system, the card provides you with a VR sound experience. Alphatron supports two or four simultaneous sound sources, and multiple ISA-based units can be plugged in side by side to provide as many sound sources as you need. Alphatron ships with sound-editing software and functions as a complete MIDI studio to aid in the creation and editing of sound.

MOVING AND REACTING

VR movement-tracking and interactive hardware generally supports two kinds of *immersion*: 6DOF and 3DOF. The former recognizes forward-and-back, up-and-down, left-and-right, pitch-up and -down, yaw (or angle) -left and -right, and rotate-left and -right motion. The latter recognizes only up-and-down, left-and-right, and forward-and-back motion.

You don't need complicated or expensive hardware to record 6DOF. You can actually achieve it with normal mouse movement—forward, back, left, and right—where you depress one button to get up and down and slide from side to side, and the other button to control pitch and yaw. You can also use a joystick, but even a joystick requires two buttons for true motion. All of the following products support 6DOF.

ThrustMaster's **Flight Control System** (\$99.95) joystick is a takeoff of a fighter-jet control stick. As with most joysticks, it

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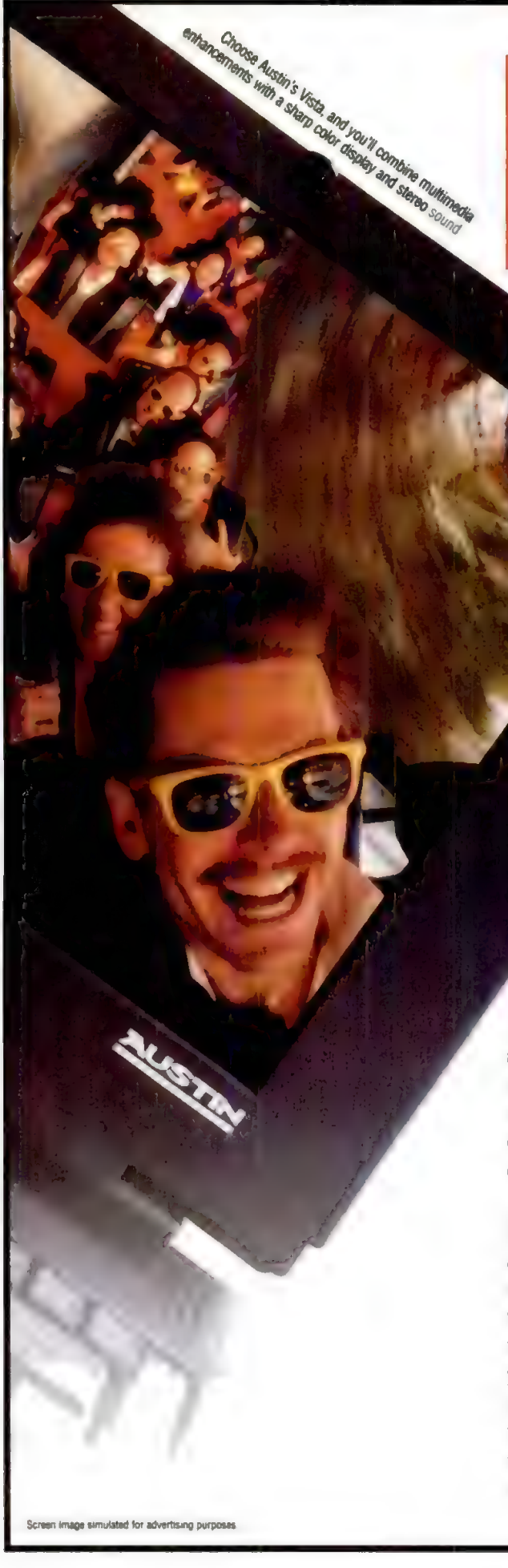
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Virtual Reality

plugs into the game port and requires no driver software. It has several buttons and a four-way hat switch that lets you look around the cockpit. Depending on the software, the Flight Control System can emulate 6DOF in a number of ways.

Spacotec IMC Corp.'s **Spaceball 2003** (\$1,195) is a platform with an easy-grip ball mounted in a depression. Your arm rests on the platform while your hand reaches down to grip the ball. The ball has a button on top and there are eight buttons across the platform. To navigate, you can push or pull the ball in six directions. Its unusual design will appeal to CAD users who need to navigate through complex 2-D and 3-D architectural and mechanical designs. Support for the device can also be found in all the major toolkits used to build VR worlds.

Logitech's **CyberMan 3D Controller** (\$69.95) is essentially the company's three-button mouse on top of a movable stick. The stick is attached to a movable base. The mouse can pivot on the base and be moved up and down in order to record 6DOF. Because the pivot point is on the post, you can control pitch and



Virtual I/O's I-glasses!

yaw, move up and down, or rotate left and right. The CyberMan also has a tactile feedback feature, which provides vibration effects when bullets or explosions shake up your VR world. There's a potential software conflict: Some programs expect devices to center themselves in order to stop motion. Usually there's a notch or divot in the center, or a spring action that automatically returns the mouse to center when you let it go. The CyberMan includes no such centering assistance.

One of the problems with VR is that users have to enter textual commands and

data while interacting with a virtual world. Infogrip's **BAT Personal Keyboard** is an answer to this conundrum. The seven keys of the BAT, designed for one-handed use, duplicate all the keys of a standard 101-key keyboard. Multiple, simultaneous keystrokes (called chords) are associated with each ASCII, function, and control character. The user can have one hand on a BAT and the other on a 6DOF pointing device.

TRACKING DEVICES

With the aid of tracking technology, VR users have yet another way of navigating through virtual space. Trackers are devices that find your position and orientation in the real world and relate them to the virtual one. Trackers vary widely in technology and form. Among the technologies used to record movement are rockers filled with mercury, radio waves, ultrasound, and laser tracking systems (the last are found mostly in high-end, proprietary solutions). Most of the more affordable tracking systems are 3DOF trackers, which are aimed at the games market and serve as a middle ground, somewhere be-



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GRAPHICS
Virtual Reality

tween a desktop environment and the free space of the 6DOF trackers.

• **LIMITED FREEDOM**

Precision Navigation's **Wayfinder-VR** (\$600) is a 3DOF tracking system that plugs directly into your serial port. The Wayfinder-VR is bundled along with a number of different head-mounted displays. The Wayfinder-VR's sensor is housed in a 2-by-3-inch box that you must either attach to your HMD or hold in your hand.

• **FULL FREEDOM**

Polhemus's **FasTRAK** (\$5,750) uses an electromagnetic-based tracking system to provide you with a full 6DOF. The system consists of one small lightweight sensor, which you place on your head (or head-mounted display). Additional sensors can be purchased for \$765 each, and can be placed on your hands, chest, or waist. A small transmitter sends out signals that are read by the sensors and relayed back to the base unit, which is plugged into your COM port. FasTRAK has a low latency rate of 4 milliseconds, which keeps users



Fifth Dimension Technologies' 5th Glove DFK

from getting sick. The system is supported in most VR toolkits.

A new, somewhat more affordable tracker from Polhemus, the \$2,000 **Inside-TRAK** (\$2,250), is an ISA card that ships with a transmitter and two sensors. The InsideTRAK delivers smooth motion tracking. Most of the VR software-development environments support Inside-TRAK. The development code and tools shipped with the Polhemus units enable you to integrate the systems into any C-based development tool with relative ease.

Ascension Technology Corp.'s **Flock**

of Birds 6DOF position-tracking system (\$2,695) comes with a transmitter, one receiver or tracker, a Bird electronics unit, a CRT synchronization cable, and a power supply. The unit has a magnetic-field transmitter (using pulsed-DC power) for position tracking. The Bird has two independent serial port connectors to the host PC or workstation. The Bird unit also has a Fast Bird Bus that lets you interconnect multiple bird units. Flock of Birds also ships with diagnostic utilities and interface software.

Logitech's **3D Mouse** (\$999) is an ultra-high-frequency, 3-D space-tracking system that plugs into the serial port. The unit consists of a tracking transmitter and a receiver/microphone, as well as an external box to translate between the two. The tracker provides 6DOF for up to four sensors without extra cabling. This style of tracking can be highly accurate as long as you stay relatively close to the transmitter.

• **FULL FREEDOM PLUS INPUT**

InWorld VR's **CyberWand** (\$99) with optional Polhemus sensor (\$765) is basically

Discovery Toys in Martinez, California makes educational products you can't help but pick up, explore, and learn from. Which probably goes a long way toward explaining why they recently made the move to Microsoft® Windows™ and Microsoft Office. You see, we do our best to make technology inviting, easy to use, and, well, fun. "Everything about Windows and Office is intuitive," says Network Administrator Dave Yount. "People just know how to get

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Virtual Reality

the handle of a Flight Control System without the base. The virtual controller's four buttons and 2-D hat sensor track six degrees of movement.

Fifth Dimension Technologies (5DT) has announced its 5th Glove data glove and flexor strip kit (**5th Glove DFK**). The 5th Glove DFK has a list price of \$495 (\$345 for the left-handed version) and each extra flexor strip is \$45. The DFK provides a data glove, a flexor strip (with an elbow- or knee-joint sensor), an interface card, cables, and KineMusica software. The package is intended as an affordable alternative to the sophisticated \$10,000-plus data gloves currently available. It employs flexible optical-bending sensing to track hand and arm movement. The glove can be used with 5DT's ultrasonic tracking system, the 5DT Head and Hand tracker (\$245), which can track movement from up to two meters away from the unit's transmitter.

The costly **CyberGlove** (\$9,800), from Virtual Technologies, is the state-of-the-art, high-end data glove for completely reactive immersive environments. The spandex-like glove houses 18 sensors to track accurately just about every move your hand is capable of making. The accompanying software includes a three-dimensional hand model that can be added to whatever VR application you're using. The glove includes a mount for Polhemus and Ascension sensors.

VISUALS

So now your PC can render beautiful 3-D objects and play 3-D sound. You can manipulate VR objects, and the VR application even knows where you are. Now if you could only see all of this in a way that makes it seem truly *real*. Head-mounted displays fill this void.

Most HMDs come in one of two flavors: monoscopic or stereoscopic. Monoscopic devices simply provide the same view for each eye. Stereoscopic devices, on the other hand, provide a separate 2-D view for each eye. The fact that one eye sees a slightly different perspective lets the brain merge the scene into depth. Most HMDs employ either tiny LCD screens or mirrors with LCD screens to

form eyeglass-size images.

CrystalEyes PC (\$985), **CrystalEyes** (\$1,300), and **CrystalEyes VR** (\$1,995), all from StereoGraphics Corp., take a different approach. Instead of having you look at two small images in a head-set, you look *through* the CrystalEyes lenses at your own PC monitor for a 3-D stereoscopic view. Each CrystalEyes unit ships with special software, and CrystalEyes PC adds hardware to give your PC the stereo capabilities.

(With CrystalEyes you use a GDC-3 controller; with CrystalEyes VR you get a special module for your PC.)

Once you're set up, the hardware/software combination splits your monitor's signal into two 60-Hz signals. These two signals are synched with an LCD lens shutter system, which closes one eye view and then the other while the monitor alternatively shows each view. The synchronization is performed by a small box called a Sync Doubling Emitter. The end result is a surprisingly realistic 3-D look.

Forte Technologies' **VFX1 HMS** headset comes bundled with a 3DOF tracking system and a CyberPuck interface device, all for under \$1,000. With a TSR called VRMouse, you

can run the system with applications that only accept mouse and keyboard input. Navigation is handled through the combination of headgear and a hand-held device. The tracking is adequate for games and simple VR applications. The system comes with an ISA-based card for both the HMD video and tracking.

Virtual I/O's **i-glasses!** is a fantastic low-cost, lightweight HMD that looks like wild sunglasses with headphones and a strap to hold them on your head. It combines good resolution with an unencumbered feel. The lenses are partially see-through, which will make it a little less

taxing on the eyes and let you run VR applications that *overlay* on top of the real world. Also, the picture is farther away from your eyes than in the VFX1 HMS, which decreases eye strain.

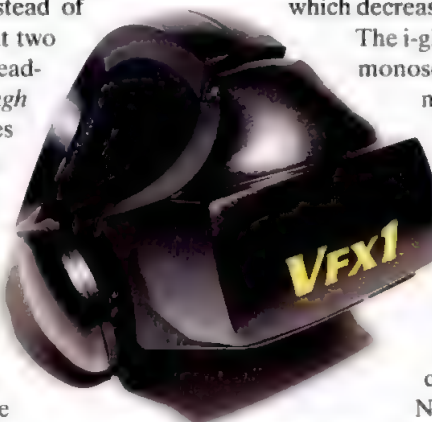
The i-glasses! can switch between monoscopic and stereoscopic modes and also includes a power switch and volume control. It runs off an NTSC signal and needs a converter box to function with the PC output. Fortunately, the unit ships with AI-Tech's Multipro CTV converter, which provides NTSC conversion of up to 640-by-480 resolution in any color depth. Although the

hues and contrast are not broadcast-quality, they are well above acceptable. The i-glasses! has a list price of \$599, and is \$799 with the converter box.

General Reality Co.'s **CyberEye** HMD (\$1,995) is designed for users such as stock-market traders who must access their keyboards or phones while working in a virtual environment. The glasses have a heads-up mode that lets you tilt or lift the glasses up slightly to see the monitor and the real world at the same time. The resolution is generally good, but type sizes below 20 points were unreadable on the units we tested.

Virtual Research Systems' **VR4** (\$7,900) offers the best-quality image (thanks to increased color contrast) and the most functional design of any unit we tested. The VR4 can be cinched to your head, and the cable is on a horizontal tail mount that hangs four inches off the back of the set. It also has an easy mount for Polhemus and Ascension sensors, though you can mount any sensor you want.

Finally, a PC-based VR turnkey system can ease the VR hardware hunt. Virtuality/IBM's **Elysium** system integrates an IBM ValuePoint Performance Series computer with Virtuality's proprietary VR accelerators, HMD, tracker, 6DOF input device, and development software. Elysium systems will be marketed by IBM's European division, and prices of the development systems will start around \$30,000. □



Forte Technologies' VFX1 HMS



Infogrip's BAT Personal Keyboard



Conceptual design by Robert P. Humenik and Jerry D. Flynn of McDonnell Douglas Space Systems

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WHAT HAPPENS

WHEN YOU ADD **SIZE**

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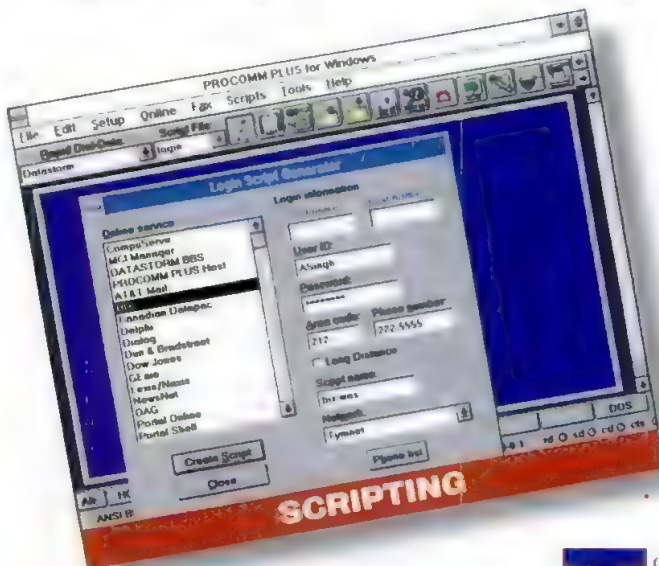
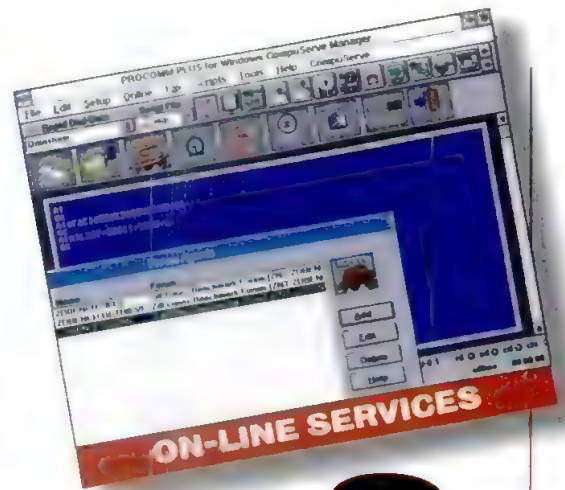
At 7 feet 2 inches tall, Kareem Abdul-Jabbar has got some serious size. But that's only half the story. The fact that he added superior basketball skills to an already imposing frame is what made him a dominant force in the NBA for two solid decades.

The new ergonomically and aesthetically designed Elite series of monitors from MAG InnoVision have features that other monitors just can't touch. And the fact that they only come in the larger 15-inch, 17-inch and 21-inch sizes with the most advanced CRT technologies makes them truly fantastic. Advance Display Calibration, Green Energy and LCD displays combined with ultra high resolutions up to 1600 x 1280, lightening-quick refresh rates and crystal clear dot pitches make them impossible to beat. And since they're so reliable, we'll even throw in a 3-year limited warranty.

So pick one up at a MAG InnoVision dealer near you. Their larger size and imposing features are liable to dominate the market for years to come and they cost a lot less than, say, an NBA draft pick these days.



Do You Still Need Comm Software?



By Frank J. Derfler, Jr.

If you have a specialized communications need, there's probably a comm package designed to meet it. But the best bet for both the personal and the professional user is still a general-purpose package.

Today you can say the word *modem* in a business meeting—even at a cocktail party—and not get weird looks. Millions of people who don't know their parity settings from their stop bits are happily up- and downloading e-mail and cruising on-line, from CompuServe to the Internet. It's definitely cool to be connected today—as long as you don't take the “vee-dot” business too far (that is, as long as you don't sound like a nerd).

The key to being connected, of course, is the software you use to make the link. Chances are, the non-nerds who talk superficially about modems are mostly using special-purpose, “boutique” communications programs like WinCIM for CompuServe, WinGopher for the Internet's Gopher space, or the proprietary front ends for Prodigy and other similar services: One program, one function. But there's a class of multipurpose communications programs—call them comm tools for nerds—that's been around for more than a decade providing PC-to-PC links and BBS (bulletin-board system) connections, emulating “dumb” terminals, and creating complex scripts for dedicated custom communications applications.

They're the well-honed tools we use to do everything from downloading the latest device driver from a vendor BBS to solving tough corporate communications problems.

LONG HISTORIES

Many of these general-purpose communications programs started out in the DOS (in some cases, the CP/M) environment, making the transition to the graphical environments of Microsoft Windows or IBM's OS/2 over the past few years. The move to Windows and OS/2 added fancier menus and better presentation of the terminal-emulation sessions to these programs and has generally smoothed the rocky road to telecommunications through intelligent refinement of user interfaces.

Along the road to GUI, feature sets have swelled to bursting. Make no mistake, these comm packages are versatile products. They can talk to literally hundreds of modems, using every modula-

tion standard from V.21 to V.34 (300 to 28,800 bits per second)—with or without compression or error detection. They can transfer files using any of a dozen or so protocols, figure out exactly the right setup when you dial a service from an in-

ternal phone book, fool a host computer into thinking they are a specific type of hard-wired terminal, and take actions automatically in response to scripts that you or they create. (For more information on the latest modems—the new V.34s—see “V.34 off the Starting Blocks.”)

For this feature, we rounded up every Windows and graphical OS/2-based multipurpose comm program we could find—14 in all. An additional program, Software Ventures' MicroPhone Pro for Windows 2.0, was not ready in time.

Overall, we found a group of mature packages with similar features. Version 2.0 of Datastorm Technologies' Procomm Plus for Windows, HyperAccess 2.0 for

Windows from Hilgraeve, and Delrina WinComm PRO, Version 1.1, are the most polished and powerful general-purpose packages. Hayes Microcomputer Products' Smartcom for Windows, Version 1.1, and Digital Communications Associates' Crosstalk for Windows, Version 2.2, are not far behind.

WHO NEEDS IT?

Today, multipurpose communications programs appeal primarily to two distinct groups of users: corporate information system personnel developing in-house apps and individuals who interact with a variety of BBSs and on-line services.

Corporate customers are still moving from character-based applications to more user-friendly GUI ones, so their interest in these Windows and graphical OS/2 programs is high. Their main objective is developing customized programs that automatically dial into networked and mainframe applications and provide workers with appropriate reports, forms, or action menus. This means that above all, these developers are looking for a powerful yet easy-to-use internal programming language and the ability to get the program to act like a specific type of midrange or mainframe computer terminal. Other features with corporate appeal include the ability to work well with

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GENERAL-PURPOSE COMM PACKAGES COVER THE BASES



So what can you do with a general-purpose communications package? Most products can handle all the tasks listed in the subgroups above. Indeed, until about five years ago, general-purpose packages were all that were available for *any* task.

Today, general-purpose packages still handle most custom applications development and the bulk of BBS connections. But more and more specialized front ends are surfacing, especially for connecting to on-line services or the Internet and for e-mail.

• Procomm Plus for Windows, Version 2.0

We see two primary roles for communications programs today: In the corporate setting, they typically serve as development platforms for hand-tooled communications applications; outside

that venue, they are most often vehicles for connecting to BBSs. So scripting prowess and easy setup and management are prime selling points.

By these measures—along with its user interface—Datastorm Technologies' Procomm Plus for Windows 2.0 should appeal to a vast spectrum of users. Though not necessarily the strongest in all areas, it's strong enough in each to edge out the competition.

Casual users will like Procomm's automatic modem detection, which identifies your modem model on installation, thus eliminating or reducing setup uncer-

tainties. Users should like the intelligent use of the right mouse button and the built-in log-on scripts for many popular on-line services—including off-line mail and message handlers for CompuServe and MCI Mail. Procomm's scripting language, Aspect, is both powerful and easy to learn and use. It may not be the tool of choice for building sophisticated applications, but it's definitely a tool for serious communications automation.

The scripting tool to choose when only the strongest will do may well be Hilgraeve's HyperAccess 2.0 for Windows, and we give it an honorable mention. Because HyperAccess's language is essentially C with some proprietary extensions, programmers are likely to be familiar with it already. With HyperAccess, you can build apps that call other software—as well as apps that let other software call you.

HyperAccess also sports a refined user interface. Nice touches such as on-the-fly virus detection and auto-sensing of settings go a long way toward smoothing communications.

Newcomer Delrina WinComm PRO incorporates most of HyperAccess's strengths and has perhaps an even more usable interface. We give it an honorable mention as well.



a large variety of modems and the flexibility to address the modem-sharing schemes found in different network operating systems.

The products we review offer an impressive range of programming prowess. Crosstalk, for example, has updated its flexible yet easy-to-use CASL programming language. Once you learn CASL, you can get Crosstalk to do practically anything. Procomm also has a strong internal language, Aspect, that boasts more than 1,000 commands and functions. Corporate programmers versed in C will like the C library used in HyperAccess; they can create programs in any of the popular C and Visual Basic compiler languages that incorporate HyperAccess commands. The SCOPE programming environment in the popular Smartcom package is less powerful and flexible but easier for the uninitiated. Software Corp. of America's TalkThru provides a full-blown programming language in both Windows and OS/2. And many of these programs can compile scripts for faster execution.

Terminal emulation and modem setup lists can be deceptive feature items. It's impressive to read that Procomm has 750 modem setup strings or that Version 3.2 of FutureSoft Engineering's DynaComm for Windows has nearly two dozen termi-

nal emulations—but the large list means nothing if your specific modem or terminal isn't on it. For example, A-Talk for Windows 1.5 from Felsina Software has a short list of terminal emulations, but one item on the list is a rather rare and spectacular Tektronix graphics terminal emulation. Corporate buyers will want to check for each needed terminal and modem type.

Similarly, network architects can select from several schemes for sharing modems across LANs, including INT14, Novell's NASI, and TCP/IP addressing. Crosstalk, DynaComm, and Smartcom are examples of packages with long lists of network communications schemes, but it pays to check for the specific capability you need.

PERSONAL USERS

On the individual-user side, the BBS world seems to be thriving—if the sales enjoyed by Mustang Software are any indication. In 1994, this vendor sold nearly 15,000 copies of its popular Wildcat! BBS

software. There is no single type of client software for BBS use, so general-purpose programs must be able to call tens of thousands of active systems.

BBS callers want convenience and efficiency. This means automated dialing and connections, fast downloads, and features such as off-line message handlers to reduce connection time. They need simple scripting capabilities that capture and save received data and typed responses to automate follow-up sessions. These callers want smart phone directories and programs that adapt to different conditions. HyperAccess's ComSense feature queries the services you connect to and attempts to set sometimes-daunting parameters such as signaling speed, word length, and parity automatically.

Not to be outdone by the sophisticated on-line services, BBS programs like Wildcat! have adopted a graphical interface commonly called RIPscrip that allows even DOS dial-in programs to present nice screens. (RIP is the Remote Imaging

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Suitability to Task: Communications Software

Much has changed since our last review of communications software: Almost every e-mail and on-line service now has at least one GUI front end of its own. As a result, these packages have focused more on BBS access and corporate comm application development. We added new evaluation criteria that reflect these emerging specialties.

For our **setup and configuration** task, we look at packages primarily from the perspective of first-time or novice users of general standalone communications packages. We give better ratings to products that made installation as simple as possible and required minimal intervention on the part of the user. This included the ability to detect communications ports and modem parameters automatically. The

SUITABILITY TO TASK		
	Power	Ease
Setup and configuration	POOR	POOR
General data communications	FAIR	FAIR
E-mail and BBS front ends	GOOD	GOOD
Scripting	EXCELLENT	EXCELLENT

better packages provided an error-message troubleshooting guide for first-time installation. We look as well for context-sensitive and jargon-free help.

For **general data communications**, we consider features like modem support, both direct and through a network. We look at the provided terminal emulations, the ability to support multiple concurrent connections, and support for network modems. Better packages have clear indications of program status, including modem and file-transfer status. We also

look for the ability to make global application settings quickly, clearly, and easily; unattended host capabilities, and remote control functions

When evaluating the suitability of these packages as **e-mail and BBS front ends**, we consider the included scripts for various on-line and e-mail services and the depth of functionality provided. We look at the number of file-transfer protocols included, the completeness of the Zmodem implementation, and the inclusion of support for RIP graphics.

Scripting takes into account the package's tools for creating, testing, and implementing scripts. Creation involves the ability to record and modify scripts easily, using either the application or another language. Packages such as HyperAccess that allow you to use C scored high on *power* but not as high for *ease*. We also gave good ratings to packages that allowed you to compile and distribute completed applications.

Protocol, which substitutes graphical icons, buttons, and mouse support for the usual flat interfaces; it is becoming a popular option for many large national BBSs.) RIPscrip graphics are found in Hayes Smartcom, Mustang's Qmodem-Pro for Windows 1.1, and deltaComm Development's Telix for Windows 1.01b.

Changes are looming for basic BBS users, too. Hayes recently introduced the Smartcom BBS Dialer, a \$39 retail program that has all you need to connect to BBSs; it includes RIPscrip and ANSI graphical terminal emulation but few other bells and whistles. Similarly, the \$99 Telix for Windows focuses on BBS connectivity with few features for general on-line services. (On the other hand, organizations that would once have used a generic BBS to reach clients are turning to proprietary systems. For example, there is a growing controversy in Florida because the state wants citizens to use proprietary software to access public records.)

Some recent feature innovations and interface refinements benefit all users. For example, the host mode found in HyperAccess, Multi-Net Communications' Pmcomm 2.30, and Procomm allows callers to connect to an unattended modem and, with the proper password, up- and download files—much as if they were using remote-control software. The graphical representations of modem status lights found in such programs as Pro-

comm and WinComm PRO let people with internal modems see what, if anything, is going on during connection and transmission.

Another area under development is automated modem setup; most packages know which COM port is available and give you a choice of modem setup strings. Crosstalk and Procomm are among the first products to offer more extended automation, where the program also knows the brand and model of the modem you're using and completes setup for you.

THE FAX FACTOR

Though there are still significant differences in how well some of these general-purpose communications products execute their basic functions (our performance tests, for example, show a more than two-to-one difference between slowest and fastest file-transfer speeds), several vendors have nonetheless turned to integrated fax capabilities and to suites of associated communications programs.

Delrina, which developed WinFax PRO (the most successful full-featured fax package), naturally provides integration between that product and WinComm PRO. On the other hand, DCA's Crosstalk, Datastorm's Procomm, and Mustang's QmodemPro have fairly complete fax capabilities—send, receive, view, and manage—built right in. Others will soon follow suit. Traveling Software's

CommWorks for Windows 1.0a includes its LapLink V, LapLink Remote Access file-transfer package, and standalone fax and comm modules. By midyear, it may be harder to find a Windows communications package without fax than with. Beyond what's built into the operating system itself, OS/2 users don't yet have the luxury of the data/fax combo.

Basic Internet access tools constitute another emerging feature trend with general-purpose comm packages. WinComm PRO and HyperAccess already have some ability along these lines. It will be interesting to see how much of a challenge such functionality poses to the equivalent tools already built into OS/2 Warp 3.0 and previewed in Windows 95.

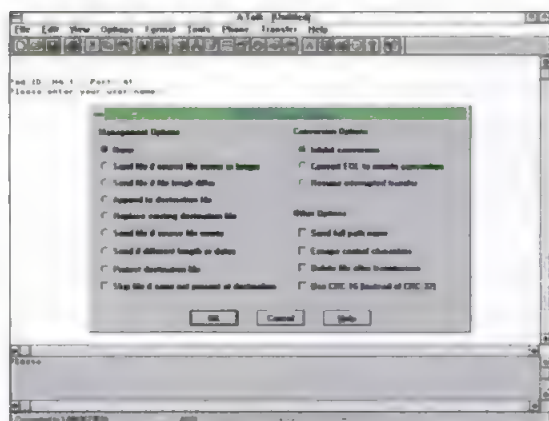
If you need communications software today, something from the rich selection of offerings that follows should satisfy your needs—no matter how demanding.

Felsina Software Inc.

● A-Talk for Windows

BY STEVEN C. M. CHEN

After debuting last year, Felsina Software's A-Talk for Windows remains the fresh face in communications software. (And at \$80, it's also a bargain compared with the other packages reviewed here.) In the latest release—Version 1.5—Felsina has made some major additions: features that are compatible with Microsoft



An easy-to-use Zmodem option, shown here with a split window, is offered in Felsina's A-Talk.

Office (such as short-cut menus) and support for Microsoft Mail and Lotus cc:Mail.

But by some standards, A-Talk could be considered a youthful package. It lacks complex features, such as compiling and scripting options, and its performance was middling on our tests. A-Talk is better suited for the person with basic communications needs, such as connecting to a BBS. It doesn't make sense for a demanding communications environment.

START TALKING

Setting up A-Talk is not too difficult. The program automatically detects which COM ports are available and whether a modem is present. Although it can't detect what kind of modem you have, A-Talk does provide a list of over 300 modems to choose from. During setup, you can select the files you want to install, such as sample scripts, phone book files, and terminal emulation. A-Talk supports all the standard terminal emulations and file transfer protocols, as well as Tektronix 4010/4014 graphics terminal emulation.

A-Talk's documentation is somewhat confusing; Felsina hasn't updated it from Version 1.0. But all the new information is in the README file. Program help is also provided, as is technical support.

BACK TO THE BASICS

A-Talk provides preconfigured scripts for logging onto BBSs and CompuServe. They are, however, rudimentary; they log you on but don't do much else. And A-Talk's scripting options are so limited that you can't write a script that will do more. The package has a long way to go in this area.

Currently, A-Talk has only about 60 commands (some packages have more than 200) and very basic predefined scripts. Again, this is fine for the individual user but doesn't make much sense in a more complex environment. A-Talk does, however, support DDE for both client and server, which means the package can control or be controlled by other packages.

A-Talk has a few other shortcomings as well. Although it has a host mode for unattended file transfer, that feature is slow and doesn't have any setup options.

In addition, A-Talk doesn't support RIPscript; nor does it have modem indicator lights for systems with internal modems.

As far as accessing phone entries goes, A-Talk makes you go through its phone menu (also used for dialing or hanging up). But once you get to an entry, making the call is easy. You can create multiple phone books for different types of phone entries. And A-Talk includes several entries with the default phone book.

On our performance tests, A-Talk produced mixed results. Although its Zmo-

dem Transfer and Kermit Upload results were acceptable, the package turned in some of the worst scores on our Background Tasking, Screen-to-Screen Buffer Capture, and Xmodem-1K Transfer tests.

So if the ability to write complicated scripts or work in a demanding communications environment is what you're after, A-Talk probably isn't a good pick. But if basic modem capabilities and access to a couple of on-line services are all you need, A-Talk may be the package for you.

Traveling Software Inc.

CommWorks for Windows

BY KEVIN REICHARD

TS OnLine is the data communications component of the \$199.95 CommWorks for Windows, Version 1.0a, from Traveling Software—a suite of communications tools that also includes TS Fax, LapLink Remote Access, LapLink V, and LapLink Alert. The overall emphasis in CommWorks is on portability. Too often in the past, software meant for mobile computing had substantial compromises; not so with this package. TS OnLine stacks up well against the other standalone communications products in this roundup. It's clearly as appropriate for users of desktop systems as it is for travelers.

There's something reassuringly familiar about TS OnLine, too. Traveling Software licenses the product from FutureSoft, creators of Microsoft Windows 3.1's Terminal. (The standalone version available from FutureSoft is called Terminal Plus.) If you can handle Terminal, you've got a jump on this package.

ONE STEP BEYOND

TS OnLine moves well beyond Terminal with the addition of dialing directories and a powerful scripting language. The dialing directories set the parameters for connections to specific on-line services and BBSs. Popular on-line services like CompuServe, GENie, and MCI Mail are preconfigured (sans telephone numbers—an especially puzzling omission given MCI Mail's toll-free numbers). Because each dialing directory is a separate file, you can have an unlimited number of directories, each with up to 200 entries.

You don't, however, need to set up an entry in a dialing directory to make a con-

FACT FILE

A-Talk for Windows, Version 1.5

List price: \$80 **Requires:** 1MB RAM, 1MB hard disk space, Microsoft Windows 3.0 or later. **In short:** Users with basic communications requirements that aren't likely to change should take a look at A-Talk. But why buy a fresh package from the new kid on the block when there are so many better choices already on the market? A-Talk lacks certain features that most users have come to expect, such as compiling and scripting options; however, it's the only package in this roundup that's compatible with Microsoft Office. Our tests reveal A-Talk to be an adequate performer.

Felsina Software Inc., 4440 Finley Ave., #108, Los Angeles, CA 90027; 800-300-1803 (orders only), 213-669-1497, fax, 213-669-1893

441 on reader service card

SUITABILITY TO TASK

	Power	Ease
Setup and configuration	FAIR	POOR
General data communications	FAIR	FAIR
E-mail and BBS front ends	GOOD	FAIR
Scripting	FAIR	FAIR

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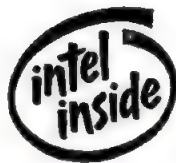


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CIRCLE 379 ON READER SERVICE CARD

nection. Like Terminal, TS OnLine allows you to enter a phone number and communications parameters on the fly. Because of this flexibility, most intermediate and advanced users—especially BBS users who love to cruise the boards—will find TS OnLine highly useful.

HIDDEN SURPRISES

The package's powerful scripting—or rather programming—language is in itself a pleasant surprise. With over 42 functions and over 171 commands, it's on a par with the heavyweights in the field and is clearly geared for advanced users and corporate MIS departments. Creating a script from scratch involves writing a true compiled program (a compiling feature is built into CommWorks), complete with all the baggage programming entails. Beginners who want to automate a connection to an on-line service will need to record a script and hope it works. Unfortunately, the scripting reference can be accessed only via on-line help, not in the printed documentation.

It's important to realize the extent to which TS OnLine relies on these scripts. For instance, you don't change the interface colors in TS OnLine via a pull-down

menu; you run a script. The bulk of scripting functions, however, is concentrated in connectivity commands (such as setting communications parameters) and DDE calls. The program's DDE prowess is noteworthy. The sample DDE script provided exports data to Excel without further changes, and a host of other DDE options allows data to be seamlessly transferred.

Even beginners should find enough of value in TS OnLine to warrant purchasing CommWorks, especially considering all the other connectivity software it contains. Laptop users will appreciate the all-in-one approach to connectivity found in the greater CommWorks package. And as novices gain communications skills, TS OnLine will continue to yield pleasant surprises when it comes to productivity.

Digital Communications Associates Inc.

● Crosstalk for Windows

BY STEVEN C. M. CHEN

Digital Communications Associates hasn't broken away from tradition with its latest release of Crosstalk for Windows, Version 2.2. This long-established communications package (\$179 as a stand-alone or \$195 with Crossfax) has not changed its focus: Crosstalk is still geared primarily toward the corporate environment—especially with network installations now included.

The package also has built-in TCP/IP support and a handy new feature, the QuickPad, which is essentially a macro-writing utility. And Crosstalk still uses CASL, a powerful and flexible scripting language.

With its many and varied attributes, Crosstalk (an Editors' Choice when we last reviewed communications software almost two years ago) continues to be a standout. But it has retained some of its less ingratiating traits—in particular, an unfriendly user interface—and is

no longer alone in the Windows environment. Many Windows-based comm packages have either caught up with or surpassed Crosstalk since our last roundup. Nevertheless, this package remains an excellent product for the technically sophisticated user.

The powerful scripting language in CommWorks is a pleasant surprise, with over 42 functions and over 171 commands.

OPENING UP THE LINES

Crosstalk's installation and setup are simple and straightforward, even if you're installing on a network. (Crosstalk is a space hog, though; it requires 5.8MB for a full single-workstation installation.) You get more than 200 modem

setup strings, including one for V.34 modems, which allow connection speeds of up to 28.8 Kbps. Crosstalk is one of the very first packages to offer a setup string for the V.34 protocol. (This standard was just released in the fall of 1994.)

Crosstalk automatically detects and sets the serial port and modem parameters for you. Five types of connections are supported, including INT14, NASI, and telnet. Crosstalk also supports a full array of standard file transfer protocols, including DART, IND\$FILE, and its proprietary Crosstalk protocol.

JUST READ THE SCRIPT

This package comes with about a dozen preconfigured scripts for logging on to the Internet, BBSs, and on-line services such as CompuServe. (These are good tools for learning the scripting language, if you're

▶ FACT FILE

CommWorks for Windows, Version 1.0a

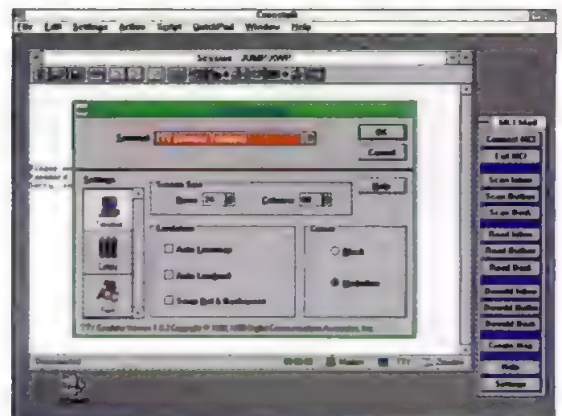
List price: \$199.95 **Requires:** 2MB of RAM (4MB recommended), 6.5MB hard disk space, Microsoft Windows 3.1 or later. **In short:** TS OnLine, the communications component of CommWorks for Windows, is for the most part as easy to use as Windows' Terminal. The powerful scripting language is difficult to master and therefore more suitable for advanced users. But TS OnLine will be a worthwhile purchase for most users. The other suite components include TS Fax, LapLink Remote Access, LapLink V, and LapLink Alert.

Traveling Software Inc., 18702 N. Creek Pkwy., Bothell, WA 98011, 800-343-8080, 206-483-8088; fax, 206-487-1284

442 on reader service card

SUITABILITY TO TASK

	Power	Ease
Setup and configuration	GOOD	GOOD
General data communications	FAIR	FAIR
E-mail and BBS front ends	GOOD	FAIR
Scripting	GOOD	FAIR



Instead of the phone book entries used in other programs, Crosstalk has what it calls *sessions* for connecting.

so inclined.) Crosstalk also has its own BBS, which you can call directly or reach via CompuServe.

CASL, the scripting language that Crosstalk uses, is extremely powerful and now includes support for calling external DLLs. The learn mode can do some of the scripting work for you by recording your keystrokes; unfortunately, it can't record menu functions. If you need guidance on scripting, don't count on the on-line help; make sure that your programming guide is handy.

A fax-back service is available, providing some technical information not included with the documentation. You can also set up QuickPads, which function like macros. These are fairly easy to set up and allow you to do things like download all your e-mail.

Instead of using a phone book approach for entries and dialing, Crosstalk uses *sessions*. As with other packages, making changes requires users to know about such things as parity, modem settings, and so forth. Crosstalk does allow parameters (such as port or modem settings) to be set differently for different sessions, which is quite useful.

Even though Crosstalk's interface is

unfriendly, the status bar located at the bottom of the window will allow you to make on-the-fly changes to the type of connection, terminal emulation, or file transfer. Again, Crosstalk's on-line help is scant, but the manuals are quite good.

If you're an established Crosstalk user and want to upgrade from the original DOS package or the latest Windows version, you'll be pleased with what this package has to offer. It was consistent on our performance tests, turning in good to average scores throughout. If you're new to communications software, however, a program like Smartcom for Windows may be better. For the technically oriented user, though, Crosstalk is definitely worth a look.

Delrina Corp.

Delrina WinComm PRO

BY JOE SALEMI

With Version 1.1 of WinComm PRO, Delrina Corp. has released a communications package with something for just about everyone. Although some features (such as the complex and powerful scripting language) will be better appreciated by communications sophisticates, the package's ease of use makes it appropriate for casual users as well. Users of Delrina's WinFax PRO should be comfortable with WinComm PRO's very similar interface.

As for new features, Delrina has jumped on the Internet bandwagon, adding Internet Messenger—a complete front end to various Internet mail access providers. WinComm PRO still has the powerful HyperAccess communications engine (based on HyperAccess 1.0) and automatic virus scanning.

GETTING WITH THE PROGRAM

WinComm PRO's setup program gives you the choice of complete, laptop, or custom installation. If you have WinFax PRO installed, WinComm will automatically choose the same COM port, allowing both to share the port when you have WinFax set to auto-answer. This lets you leave your fax program running while you go in and out of WinComm PRO. Settings



The file-transfer screen in Delrina's WinComm PRO tells you whether the virus filter is active.

for over 220 modems are provided, but the program doesn't detect the modem type automatically.

The setup program doesn't make any changes to your system settings unless you have a 16550 UART running; if you're running WinComm PRO under Microsoft Windows for Workgroups, the Setup Guide lists recommended changes to SYTEM.INI that you have to make yourself.

When you run WinComm PRO for the first time, a registration dialog box asks

FACT FILE

Crosstalk for Windows, Version 2.2

List price: \$179. **Requires:** 4MB RAM, 4.5MB hard disk space, Microsoft Windows 3.1 or later. **In short:** Designed for slightly more experienced communications users, Crosstalk is technically an excellent communications package with an up-to-date scripting language. It includes many predefined scripts that go beyond the basic log-on routine. But Crosstalk's user interface does not equal its technical excellence, and its on-line help stops short of being truly helpful. The QuickPads make some of the routine tasks more manageable and fun; several predefined QuickPads are included.

Digital Communications Associates Inc., 1000 Alderman Dr., Alpharetta, GA 30202-4199, 800-348-3221, fax, 404-442-4358

443 on reader service card

	SUITABILITY TO TASK	
	Power	Ease
Setup and configuration	GOOD	FAIR
General data communications	FAIR	FAIR
E-mail and BBS front ends	GOOD	FAIR
Scripting	GOOD	FAIR

FACT FILE

Delrina WinComm PRO, Version 1.1

List price: \$129.00; upgrade, \$19.95, competitive upgrade, \$49.00; Delrina WinComm and Delrina WinFax PRO suites, \$179.00 each. **Requires:** 4MB RAM (8MB recommended); 4MB hard disk space (7MB with Delrina Internet Messenger), Microsoft Windows 3.1 or later. **In short:** WinComm PRO shares a number of features with HyperAccess for Windows, including its powerful but complex scripting language. It can share a COM port with WinFax PRO and also provides a front end for Internet e-mail. It has some quirks, though, and is better used as a platform for creating sophisticated communications applications.

Delrina Corp., 6320 San Ignacio Ave., San Jose, CA 95119, 800-268-6082, 408-363-2345; fax, 408-363-2340

444 on reader service card

	SUITABILITY TO TASK	
	Power	Ease
Setup and configuration	GOOD	GOOD
General data communications	GOOD	GOOD
E-mail and BBS front ends	GOOD	GOOD
Scripting	EXCELLENT	FAIR

Performance Tests: Communications Software

During the course of our testing, we had problems with many of the packages. In several cases, connect strings did not perform as specified. We suggest that when setting up your modem, you make an effort to verify (by checking the program's status indicators) that the settings in your modem definition string are actually being used. Better packages give you the relevant information—connect speed, throughput rate, and transfer protocol—up front.

What the Numbers Mean

Of the Windows packages, A-Talk for Windows, Version 1.5, was clearly the slowest on all our tests—except for the Zmodem Transfer test, where it fell in the middle of the pack. The fastest package overall was Relay/PC 6.0 for Windows, again with one notable exception: the Kermit Upload test. If performance is a prime consideration, you should certainly consider Relay/PC—unless of course you rely extensively on the Kermit protocol. Smartcom for Windows, Version 1.1, was by far the fastest package on our Kermit Upload test, because it defaults to a 1K packet size (rather than the standard 128-bit size for Kermit). This allowed it to fly by the competition. Other packages can also be adjusted up to the larger packet size, but none of them defaulted to it.

Of the two OS/2 packages, Pmcomm, Version 2.0, was a clear leader, while Version 2.3 of TalkThru was one of the slowest packages overall. Although OS/2 is a multithreaded OS and therefore has a theoretic advantage when background

processing comes into play, neither OS/2 package demonstrated any advantage over the (single-tasking) Windows-based packages on our Background Tasking test.

If you plan to use a comm package to perform background transfers, you may be able to improve your results significantly by tinkering with the foreground/background performance settings in Windows. The relative allocation of processor time can have a dramatic impact on a package's ability to transfer files while you are running another task in the foreground.

Our Editors' Choice—Procomm Plus for Windows, Version 2.0—was a performance leader on two of our tests and near the top of the pack on the rest. HyperAccess 2.0 for Windows and Delrina WinComm PRO, Version 1.1, performed well overall (and produced very similar results to each other, which is not surprising since they are built on the same base code).

How We Tested

To test the performance of this year's comm packages, we used two Practical Peripherals PM14400FXSA V.32bis modems supporting connections of up to 14.4 kilobits per second, allowing compressed transmissions at up to 57.6 Kbps.

The client modem was attached to a Compaq Deskpro 486/33M equipped with 16MB of RAM, a 340MB Conner hard disk, and a 16550AFN-buffered serial port. Hardware flow control was enabled to regulate the flow of data.

The host modem ran on a Hewlett-Packard Vectra XU 5/90c with 16MB of RAM and Wildcat! BBS Suite 4.0, a DOS communications package.

We ran each test three times, using a stopwatch to measure the timings. We report the average of the times for the results.

For the **Screen-to-Screen Buffer Capture** test, a 100K ASCII file is displayed on the host monitor, transferred via modem at 14.4 Kbps, and displayed on the client PC's monitor. This test reveals how a comm package handles a steady stream of data and whether it can alert the receiving modem when the remote display begins to lag behind the data stream.

The **Xmodem-1K Transfer** test indicates the software's ability to support a standard protocol. The host PC sends a 480K .BMP file to the client using Xmodem-1K. We measure the duration of the transfer and the

ZMODEM TESTS		
▲ Pass ▼ Fail	Zmodem Transfer* (Min:sec)	Zmodem Auto-Resume
A-Talk for Windows	2:41	▲
CommWorks for Windows	2:48	▲
Crosstalk for Windows	2:42	▲
Delrina WinComm PRO	2:42	▲
DynaComm for Windows	2:43	▲
HyperAccess for Windows	2:43	▲
Mirror for Windows	2:42	▲
Pmcomm	2:44	▼
Procomm Plus for Windows	2:42	▲
ZmodemPro for Windows	2:43	▲
Relay/PC for Windows	2:41	▲
Smartcom for Windows	2:42	▲
TalkThru for OS/2	2:47	▲
TalkThru for Windows	2:42	▼
Telix for Windows	2:43	▲

* Shorter times represent better performance

for user information and the product registration number. You then must either let the program call Delrina's 800 number and register the program or call a voice number for a key to unlock the program; otherwise, the software stops working after 15 uses. Delrina said this is an experimental procedure to keep the company's user database up to date.

The scripting language in WinComm PRO bears a close resemblance to C, with the power and complexity that implies. Documentation is available on-line and in

a disk-based Windows Write manual. Experienced programmers shouldn't have any problems creating scripts, but non-programmers may find it easier to use the script-recording facility.

AN ON-LINE PRO

Information for on-line services is stored in WinComm PRO's own file, and predefined settings for several services, including CompuServe and GENie, are provided. Some of the preconfigured on-line scripts include access numbers; others, such as the

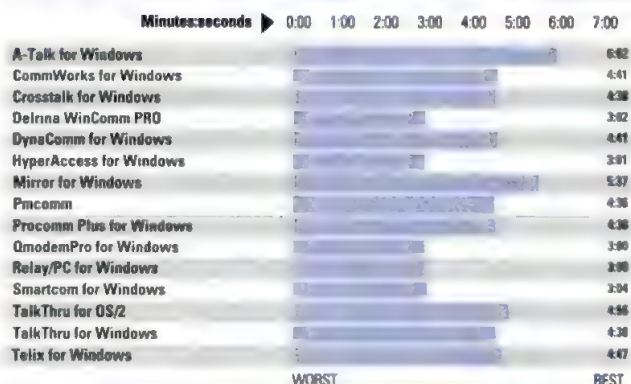
CompuServe script, require you to enter the local access number the first time you call. You can, however, store your log-on information for future use. You can also define icons for the services, so that calling involves simply clicking the icon.

For even more on-line power, WinComm PRO now includes an application called the Internet Messenger, an off-line reader and communications application for Internet mail. It works with shell or SLIP dial-up accounts (although with SLIP accounts, you need to have TCP/IP

SCREEN-TO-SCREEN BUFFER CAPTURE



XMODEM-1K TRANSFER

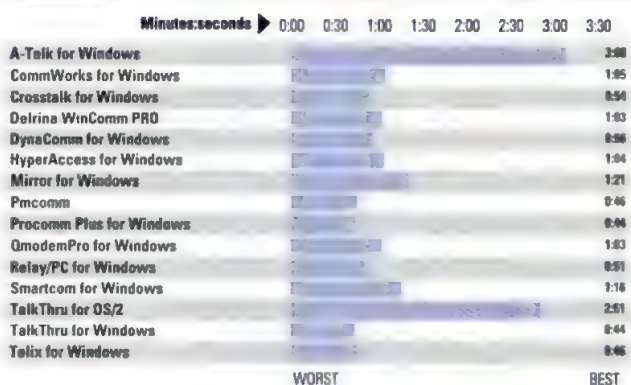


KERMIT UPLOAD



N/A—Not applicable: The product did not complete this test.

BACKGROUND TASKING



transmission rate (in characters per second). We then compare the file received by the client with the original for accuracy.

In the **Kermit Upload** test, we upload a 500K .BMP file from the client PC to our host. We used each package's default settings for Kermit transfers, so products automatically used higher throughput rates (1K as opposed to 128-bit packets) when possible.

In the **Background Tasking** test, we evaluate comm programs running in multitasking environments. For this test, a Zmodem Transfer test runs in the background while an Excel spreadsheet macro runs in the foreground. We time the Zmodem Transfer to see how quickly the multitasking environment com-

pletes background tasks given the processor overhead of the foreground task.

For the **Zmodem Transfer** test, we send a 256K .ZIP file from the host to the client PC. This test indicates whether the software can properly handle files compressed using Zmodem's on-the-fly compression only.

The **Zmodem Auto-Resume** test indicates the package's ability to recover from a crashed file-transfer session. We send one file from the host to the remote PC. When 90 percent of the file has been transferred, we interrupt the session and then restart it. If the package properly supports the Zmodem protocol, only the remaining 10 percent of the file is transferred. Results are *pass* or *fail*.

installed) from many commercial Internet providers. This feature is quite handy if you only connect to the Internet for sending and receiving e-mail.

All major transfer protocols are included in WinComm PRO, as well as the proprietary HyperAccess Hyper-Protocol, and the program can optionally scan for viruses as files are downloaded. In addition, WinComm PRO's status bar includes modem lights; if you have an internal modem, you can tell whether it's sending or receiving. The package also

has a host mode for unattended file transfer. WinComm PRO did fairly well on our performance tests, placing in the top third on all but the Kermit Upload and Background Transfer tests.

Generally speaking, WinComm PRO is an easy-to-use communications package with a powerful yet complex scripting language that's ideal for creating custom communications apps. But because of its excellent preconfigured scripts and usability, this package will work for the person with more basic communications needs.

FutureSoft Engineering Inc.

• DynaComm for Windows

BY EARLE ROBINSON

If you don't mind paying for it, FutureSoft Engineering's DynaComm for Windows, Version 3.2, has much to offer. Although at \$249 it's certainly expensive, DynaComm proves its worth with a powerful scripting language, 16 terminal emulations, and a wide choice of network connectors—including NetBIOS, NASI, and

Eicon X.25. And the new version includes auto-sizing of fonts, hooks to Microsoft Visual Basic, modem status lights, and support for multimedia. The justly renowned terminal emulations have been reworked a little, too. Although clearly not for the faint of heart, this package is well-suited for the sophisticated user with a yen for script writing.

Installing DynaComm is easy; you can choose an express, custom, or minimum installation. If you install everything, DynaComm will use over 7MB of disk space, including 2.3MB for the terminal emulation and 2.2MB for the program files.

Unfortunately, DynaComm doesn't have automatic modem detection. It can't tell you which comm port to use, making it easy for the neophyte to choose one used by the mouse. DynaComm does, however, provide a long list of modem set-up strings, which is quite useful.

The tutorial offers minimal assistance, though the optional quizzes are useful. Two thick, much-improved manuals are provided—one a users' reference, the other for scripts.

WITHOUT A TRACE

DynaComm has some neat tricks. For example, if a TCP/IP stack is installed,

DynaComm detects it and installs the necessary buttons. It also scrupulously avoids dumping files into the Windows or System directories. All files installed are recorded in a data file, which means the uninstall routine can remove all traces.

Although DynaComm's paramount strength lies in its powerful terminal emulations and network connections, the well-thought-out dialing cards make DynaComm a standout. Several numbers can be marked for sequential dialing, and the included on-line service numbers have the proper emulations already provided.

The default speed for DynaComm is always 2,400 bps, even if you have selected a high-speed modem, and phone numbers for services like MCI Mail aren't provided. In addition, Version 3.2 still hides the terminal screen while dialing, making it impossible to monitor log-ons. You can, however, enter commands in the terminal screen.

POWER PERFORMER

The powerful scripting language in DynaComm will appeal to the more technically adept. The program has 275 functions and commands to choose from, as well as good DDE support; the script manual helps you get started. DynaComm also offers a scripting editor, and debugging is handled through a Debug command. The secure host mode is another handy feature that offers protection at several levels, based on who the caller is.

DynaComm did quite well on our performance tests, except for the Kermit Upload and Xmodem-1K Transfer tests, where it lagged behind several programs. We also ran B+ protocol file transfers on CompuServe which were satisfactory, though slow to start. (DynaComm allows you to view .GIF files while they are downloading.)

Overall, DynaComm is a solid performer, although it lacks the modern amenities found in some other communications programs. The buttons are there, yes—but without any explanation.

On the other hand, certain touches are appreciated. For example, you can vary



Getting with the Windows program, FutureSoft's DynaComm has added buttons to its UI for point-and-click access.

how often DynaComm will yield to other Windows-based programs. This is useful if you are transmitting or receiving data at very high speeds and is a feature not found in many communications programs.

In spite of its stodgy interface, DynaComm is quite rich; it offers a panoply of emulations, an outstanding scripting language, and a full complement of network links. This package is definitely a good choice for turnkey applications, however, the personal user should probably look elsewhere.

Hilgraeve Inc.

• HyperAccess for Windows

BY KEVIN REICHARD

The combination of its impressive, easy-to-use structure and sophisticated programming environment makes Hilgraeve's \$149 HyperAccess 2.0 for Windows a tool that can fill almost any communications need. This package has the potential to please both the novice, who may simply want access to a local BBS, and the technically oriented corporate applications builder.

And HyperAccess reaches out to both groups from the beginning. Installation is extremely straightforward; Hilgraeve has taken pains to eliminate much of the communications jargon. The program's CommSense feature detects the communications parameters (parity, data bits, and stop bits settings) of the system you're calling and automatically sets the appropriate parameters on your end. All you have to do is supply the phone number or numbers. (HyperAccess allows you to enter a main number and two alter-

► FACT FILE

DynaComm for Windows, Version 3.2

List price: \$249 **Requires:** 640K conventional and 256K extended RAM, 3 2MB hard disk space (8MB for complete installation), Microsoft Windows 3.1 or later.

In short: DynaComm for Windows is expensive compared with the other packages in this roundup, and its interface is less than welcoming. But it provides a host of advanced features, such as a powerful scripting language and numerous terminal emulations. It also has a bevy of network connectors to choose from, including NetBIOS and NASI.

FutureSoft Engineering Inc., 12012 Wickchester Lane, #600, Houston, TX 77079-1222, 800-989-8908, 713-496-9400, fax, 713-496-1090

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SUITABILITY TO TASK

	Power	Ease
Setup and configuration	FAIR	FAIR
General data communications	GOOD	FAIR
E-mail and BBS front ends	GOOD	FAIR
Scripting	FAIR	FAIR

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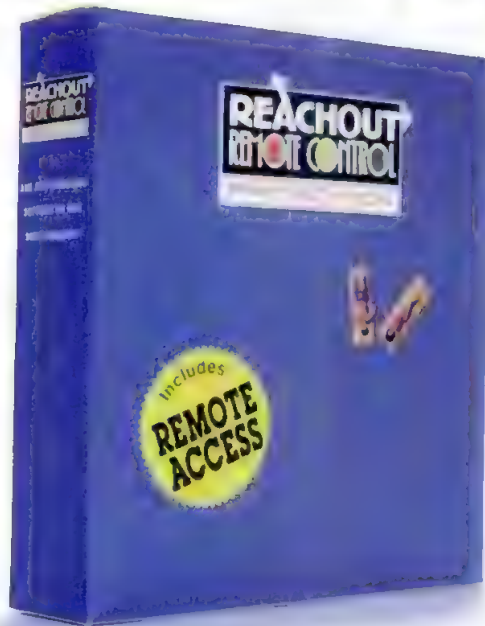
✓ #1 Ease of
Learning

✓ #1 Ease of Use

Stac

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The 45-page review for *Software Digest* covered all the bases. It was the most extensive review ever done on remote control software. In the end, the experts called ReachOut Remote Control simply "the best program in the...evaluation." It outscored the competition in not one, not two or three, but in seven categories. In its report for *Software Digest's* June '94 issue, National Software Testing Laboratories wrote:

NSTL recommends ReachOut Remote Control for its excellence in almost every category. No other program matches its number of features or ease of use, and it is the unanimous choice for best program in the testers' general usability evaluation.

The recommendation confirms the findings of exhaustive corporate evaluations. And it parallels assessments by such leading publications as *Byte*, *LAN Magazine*, *PC User*, *Network Computing*, *Government Computer News* and *InfoWorld*.

But why not judge for yourself? We will be happy to send you more information on the NSTL report. Better yet, take advantage of our 60-day money-back guarantee and order your copy of ReachOut today. Call 1-800-677-6232 ext. 211 for your nearest dealer location.

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★★★	7.5	Close-Up
★★★	7.3	Norton pcANYWHERE 1.0 for Windows
★★★	7.3	Carbon Copy for Windows

CIRCLE 060 ON READER SERVICE CARD

nates for busy on-line services.) For 12 of the more popular on-line services, such as CompuServe or MCI Mail, preconfigured setups are included.

HyperAccess has a list of 277 modem setup strings to choose from, so chances are pretty good that the program can be quickly configured to support your modem. Overall, installation goes so smoothly that you could easily be up and running without ever having to crack open the manuals.

If you do need to make configuration changes, HyperAccess simplifies the task through its logically organized menus and dialog boxes. Commonly changed parameters are found in pull-down menus, whereas infrequently used ones are placed in their own dialog boxes. If you can't find what you're looking for in those sources, you can peruse the well-organized documentation. Because arcane options are being used less and less (do you remember the last time you needed to change your duplex setting?), this structure is definitely in tune with today's communications environment.

GET THE GOODS

Once you're up and running, HyperAccess offers scads of goodies. A built-in text editor, Message Pad, allows you to

while providing for dial-backs and call logging and receiving messages.

In addition, HyperAccess can be used directly with TCP/IP or Winsock connections or internally as an e-mail or Internet front end. HyperAccess also supports other Internet mail tools (such as ELM and PINE) and applications (such as a newsreader and a Gopher client). In these cases, HyperAccess could still be a valuable tool without its ever "seeing" a COM port.

THE VIRTUAL SCRIPT

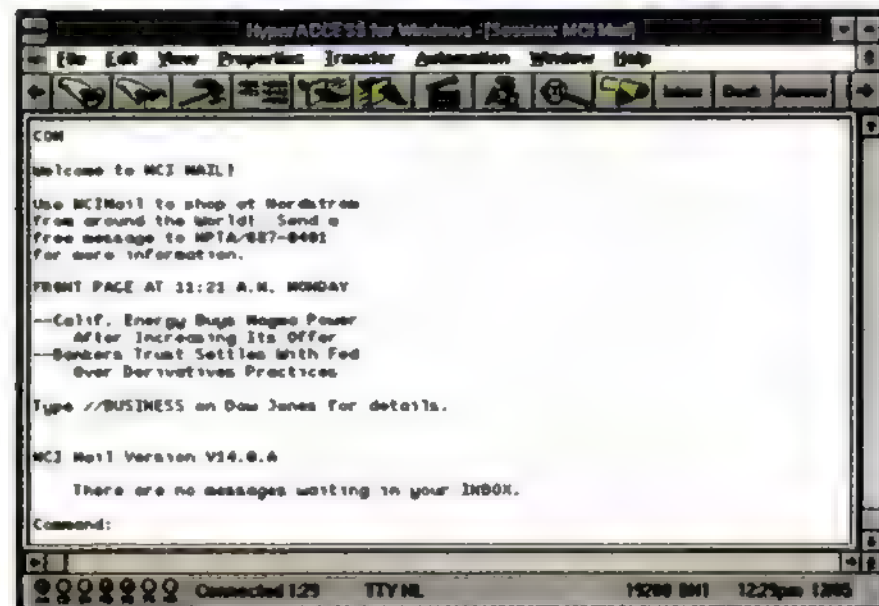
HyperAccess's scripting language (based on the C programming language) is flexible and about as open as you can get. Hilgraeve adds its own functions; your script can call on them, or you can incorporate these calls into programs written in Borland C++ or Microsoft C or Visual Basic. This means you could, for example, create your own C or Visual Basic program that connects to a remote database, grabs information, and inserts it into a spreadsheet via DDE.

The code can be run as a script or compiled for better performance. (Using HyperAccess's DDE capabilities without programming failed in our testing sequence, however.) Conversely, a C or Visual Basic program can call on HyperAccess as part of a much larger program.

Both alternatives are well explained in the separate documentation devoted entirely to the HyperAccess API.

For scripting novices, the program's recorder translates command keystrokes into the appropriate C functions. For smaller tasks, HyperAccess has a macro language that allows you to tie sequences to specific keys. Intermediate developers, the group HyperAccess does not seem to address, might want to look at a package like Smartcom.

HyperAccess seems an excellent choice for corporate users designing complex applications and novices dialing in to bulletin boards or just getting their feet wet in communications automation. It promises to meet (and possibly exceed) all of the communications expectations of a large majority of users.



HyperAccess from Hilgraeve has several prewritten scripts that quickly log you on to on-line services like MCI Mail.

create messages before uploading them. Automatic virus detection is built in. And the proprietary HyperProtocol file-transfer protocol contains RSA data encryption, which makes for secure file exchanges. HyperAccess also has a well-designed host mode that lets you limit the directories guests can access

► FACT FILE

HyperAccess 2.0 for Windows

List price: \$149. **Requires:** 2MB RAM, 1.5MB hard disk space, Microsoft Windows 3.0 or later. **In short:** Hilgraeve's HyperAccess 2.0 for Windows is a good choice for both beginning and advanced users. Installation is as easy as keying in the appropriate phone number and letting HyperAccess survey your existing setup, check your system's available COM ports, and so on. In addition, HyperAccess can be used as a front end to your e-mail system or to the Internet. It can also be used directly with TCP/IP and Winsock connections.

Hilgraeve Inc., Genesis Centre, 111 Conant Ave., Suite A, Monroe, MI 48161; 800-826-2760, 313-243-0576; fax, 313-243-0645

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	Power	Ease
Setup and configuration	GOOD	GOOD
General data communications	EXCELLENT	GOOD
E-mail and BBS front ends	GOOD	GOOD
Scripting	EXCELLENT	FAIR

SoftKlone Distributing Corp.

● Mirror for Windows

BY EARLE ROBINSON

Looking for a communications program that comes on a single floppy disk and uses only 2.3MB of disk space? Then SoftKlone's Mirror for Windows, Version 1.2, may be the communications package for you. It's lean and not very mean, but it does offer the communications basics and consumes only 4 to 5 percent of your system resources. Mirror also includes standard file transfer protocols, DEC terminal emulations VT100 through VT340, and TTY emulation.

Installing Mirror is painless but can get confusing if you're using a shell other than Program Manager. We had to exit Microsoft Windows after we installed Mirror to restore our PC Tools shell. The installation routine offers to install telnet for use with TCP/IP stacks and LAT for DEC's Local Area Transport. Curiously, Mirror for Windows can't detect Mirror for DOS files and has to ask if any such files exist. No uninstall routine is provided, but Mirror puts files only in its own directory. For former Mirror for DOS users, Mirror's configuration program will convert Mirror for

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► **S U M M A R Y O F F E A T U R E S**

Communications Software

Products listed in alphabetical order

■ = YES □ = NO

	A-Talk for Windows 1.5	CommWorks for Windows 1.0a	Crosstalk for Windows 2.2	Delrina WinComm PRO 1.1	DynaComm for Windows 3.2	HyperAccess 2.0 for Windows	Mirror for Windows 1.2	Procomm 2.30
List price	\$80.00	\$199.95	\$179.00	\$129.00, upgrade, \$19.95, competitive upgrade, \$49.00	\$249.00	\$149.00	\$195.00	\$99.95
Operating environment	Windows	Windows	Windows	Windows	Windows	Windows	Windows	OS/2
Graphical Features								
DDE client/server capability	■ ■	■ ■	■ ■	■ □	■ ■	■ ■	■ ■	□ □
OLE support	□	□	□	□	□	□	□	N/A●
Drag-and-drop support	■	□	■	■	■	■	□	■
Functions supplied on icon bar	■	□	■	■	■	■	□	■
Automatic font scaling	□	■	■	■	■	■	■	□
Program Features								
Can import/export ASCII phone directory	■ ■	□ □	□ □	■ ■	□ ■	□ □	□ ■	□ □
Can import/export from other communications products (ASCII only)	■ ■	■ ■	■ ■	■ ■	■ □	■ ■	□ □	□ □
Context-sensitive help	■	■	■	■	■	■	■	■
Fax support	□	■	Optional	■	□	□	□	□
Number of modem setup strings	300	1000	200	220	200	277	200	29
Number of phone directories	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	1	Unlimited
Number of entries per directory	80	200	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	300
Leaves system files unaltered	□	□	□	□	■	■	■	■
Password security for local operation	□	□	□	■	■	■	□	□
Text editor included	■	■	■	■	□	■	□	□
Unattended host mode	□	□	■	■	■	■	□	■
Modem indicator lights	□	□	□	■	■	■	□	□
Transfer Protocols								
CompuServe B/Quick B/B+	■ ■ ■	■ □ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Kermit/Kermit with sliding windows	■ □	■ □	■ ■	■ ■	■ ■	■ □	■ □	■ □
Proprietary	■	□	■	■	□	■	□	□
Xmodem-1K/Xmodem-G	■ □	■ □	■ ■	■ ■	■ □	■ □	■ □	■ □
Ymodem batch/Ymodem-G batch	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Zmodem	■	■	■	■	■	■	■	■
Other	WXmodem	None	DART, IND\$FILE	None	Yterm	IND\$FILE	None	IND\$FILE
Supports external protocols	□	□	□	□	□	□	□	■
Scripting Capability								
Auto-learn facility	■	■	■	■	■	■	■	■
Number of verbs	60	171	280	106	350	112	70	10 (plus REXX and C calls)
RIPscrip	□	□	□	□	□	□	□	□
Host Features								
Dial-back capability	□	N/A●	□	■	■	■	□	□
Logs calls	■	N/A●	■	■	□	■	□	□
Password access	■	N/A●	■	■	■	■	□	■
Public messages	□	N/A●	■	■	■	□	■	□
Private message/mail	□ □	N/A●	□ □	■ ■	□ □	□ □	□ □	□ □
Network Redirectors								
INT14	□	N/A●	■	■	■	■	■	□
NASL	□	N/A●	■	□	■	■	■	□
TCP/IP support	□	N/A●	■ (telnet only)	□	■	■	■	□

N/A●—Not applicable. OS/2 does not support this feature.

N/A●—Not applicable. The product does not have this feature.

* These features are available via a .ZIP file that is not loaded automatically on installation but can be loaded manually.

ENDS

PC MAGAZINE
EDITORS' CHOICE

Procom Plus for Windows 2.0	QmodemPro for Windows 1.11	Relay/PC 6.0 for Windows	Smartcom for Windows 1.1	TalkThru for OS/2 2.1, TalkThru for Windows 1.03	Telix for Windows 1.01b
\$179.00; upgrade, \$69.00	\$99.00; upgrade, \$50.00	\$99.00	\$79.00	OS/2 version: \$190.00; with VT340, \$350.00. Windows version: \$150.00	\$99.00
Windows	Windows	Windows	Windows	OS/2 or Windows	Windows
■ ■ ■ □	□ □ □	■ ■ ■ □	■ ■ ■ □	■ ■ ■ OS/2 version: N/A Windows version: □	□ □ □
■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
■ ■ ■	□ □ □ ■ ■ ■	□ □ □ ■ ■ ■	□ □ □ □ □ □	□ □ □ □ □ □	□ □ □ ■ ■ ■
■ ■ ■ 750	■ ■ ■ 310	■ ■ ■ Optional 150	■ ■ ■ Optional 180	■ ■ ■ OS/2 version: 89; Windows version: 90	■ ■ ■ 341
Unlimited Unlimited	Unlimited 4,096	Unlimited Unlimited	Unlimited Unlimited	Unlimited Unlimited	Unlimited 1,000
■ ■ ■ □ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ □ ■ ■ ■ ■ ■ ■ ■ ■ □	□ □ □ ■ ■ ■ □	□ □ ■ ■ ■ ■ ■ ■ □	■ ■ ■ □ □ □ □ □	■ ■ ■ □ ■ ■ ■ ■ ■ ■ ■ ■ ■ □
■ ■ ■ ■ ■ ■ ■ □	■ ■ ■ ■ ■ ■ ■ □	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ □	□ □ □ ■ ■ ■ ■ ■ ■ ■ (Windows version only)	□ □ □ ■ □ □ □ □
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ASCII, IN\$FILE	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ASCII	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ None	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ None	□ □ □ ■ ■ ■ ■ ■ ■ ■ ■ ■ IN\$FILE	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ None
■ ■ ■ 1,000	■ ■ ■ 182	■ ■ ■ 220	■ ■ ■ 65	■ ■ ■ OS/2 version: 123; Windows version: 125	■ ■ ■ SIMPLE, 38; SALT, 161; SALT II, 219
□	■ ■ ■	□	■ ■ ■	□	■ ■ ■
■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ □ ■ ■ □ □ □	□ ■ ■ ■ ■ ■ ■ ■ ■ ■ □ □ □	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ □ □ □
■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■ (Windows version only)	■ ■ ■
■ ■ ■	Optional	■ ■ ■	■ ■ ■	■ ■ ■ (Windows version only)	□
□	□	□	■ ■ ■	■ ■ ■ (OS/2 version only)	□

DOS dialing directories into the Windows format and will also access the Mirror III (the third version of the DOS program) dialing directory.

Though Mirror will detect which serial port is free, it won't select it for you (unlike many packages) or automatically detect the modem being used. But Mirror does have 200 preconfigured modem strings for ease of setup.

NOT THE FAIREST OF THEM ALL

Mirror offers a unique scripting option—macros. Although you can write scripts in the traditional sense, a menu option for doing so isn't available. You must choose Modify Macro, then you can open a new script. The other option is to have Mirror write you a minimacro by choosing Learn Mode from the same menu. A debugging facility isn't included either.

Like most communications packages, Mirror provides some preconfigured "macros" (or scripts) for on-line services, including CompuServe, Delphi, Dow Jones, and MCI Mail. But on-line access is an area where Mirror's crudeness surfaces. When you enter a password, it's visible—not masked, as in most other communications programs. Worse, your password is

► FACT FILE

Mirror for Windows, Version 1.2

List price: \$195. **Requires:** 1MB RAM, 1.4MB hard disk space, Microsoft Windows 3.0 or later. **In short:** SoftKlone's Mirror for Windows is a bare-bones package with enough functionality to serve users with basic communications needs; luckily this translates into its being a space-saving package for those with limited system resources. Unfortunately, its performance is not the best; SoftKlone promises to address some of the problems with a patch that will be made available to users on request. Compared with the other programs in this roundup, Mirror is expensive—especially considering its limited functionality.

SoftKlone Distributing Corp., 327 Office Plaza Drive, #100, Tallahassee, FL 32301-2776; 800-634-8670, 904-878-8564; fax, 904-877-9763.

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	Power	Ease
Setup and configuration	FAIR	POOR
General data communications	FAIR	FAIR
E-mail and BBS front ends	FAIR	GOOD
Scripting	GOOD	FAIR



CP75p Desktop

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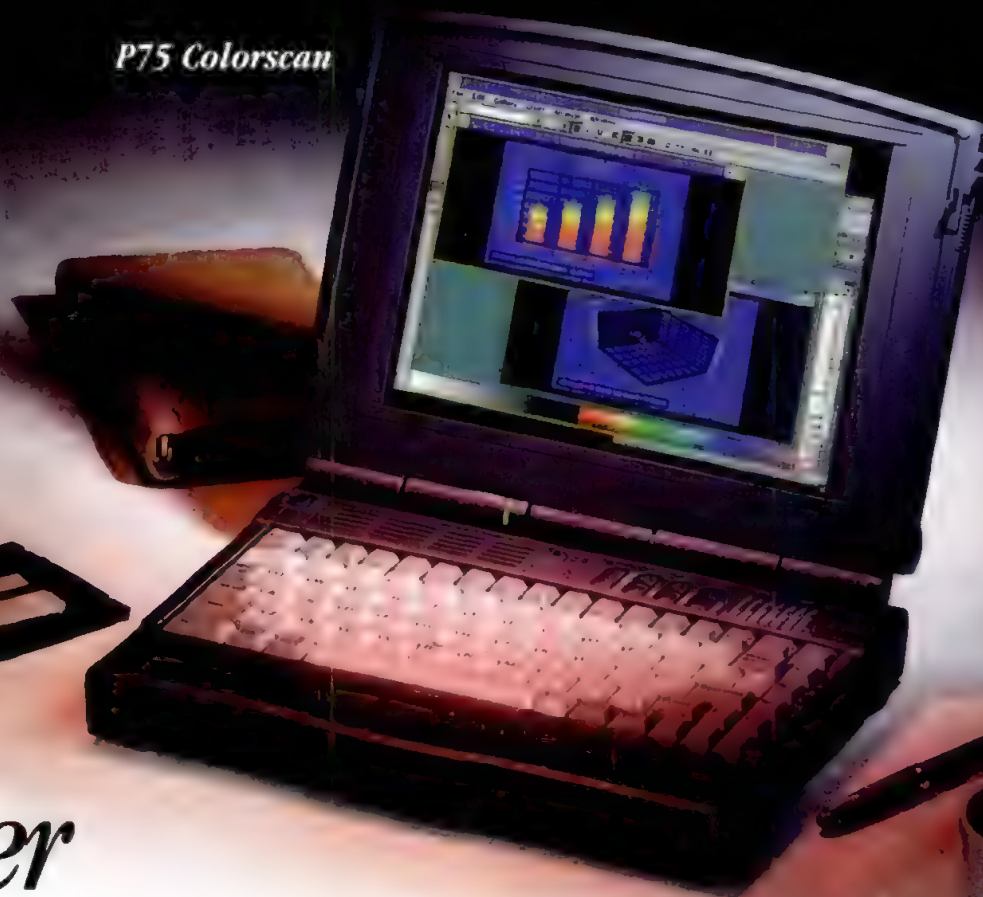
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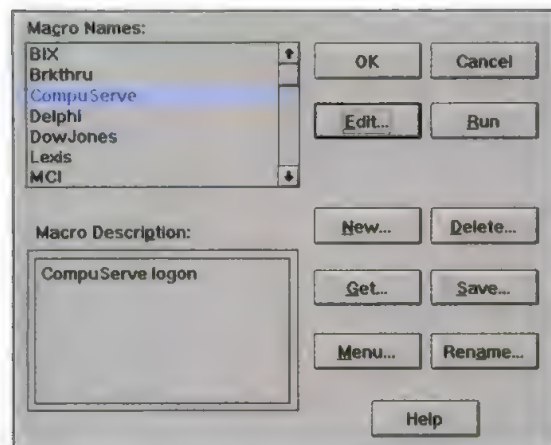
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visible to anyone who can run the configuration program. Mirror does have a host mode, but no real security is built in. To its credit, Mirror has a well-thought-out, clear manual with good explanations of script commands and program features.

No scrollbar buffer is provided. File transfers are shown, without throughput, in an ugly screen without any monitoring of transmission speed. The package lacks fax and Internet mail support and doesn't include modem indicator lights.

Formats for copying to the Windows



Writing scripts is a little different in SoftKlone's Mirror:
You have to use the Modify Macro command to get started.

Clipboard include text and comma delimitation plus graphics and Excel formats. Port connections include INT14, NASI, and telnet. Curiously enough for a program oriented toward the personal user, Mirror doesn't support the RIPscript graphics so popular with BBSs today.

As our test results show, Mirror had poor performance for Screen-to-Screen Buffer Capture; in fact, its scores were the worst of the bunch. Its Xmodem-1K Transfer and Kermit Upload scores were also unsatisfactory. And we had problems with Zmodem transfers. SoftKlone recognizes the problem with Zmodem and has promised a patch that will be available to registered users on request.

At worst, Mirror for Windows 1.2 is a limited program, offering few terminal emulations and no security. At best, it's a space saver for someone who needs an easy-to-use communications program for a subnotebook or just wants to save system resources. But you'll find other programs that offer more features and better value for a lot less than Mirror's \$195 list price.

Multi-Net Communications

• Pmcomm

BY KEVIN REICHARD

It's tough to compete in a market when the rules change. Just look at Multi-Net Communications' Pmcomm 2.30, a mainstay in the OS/2 telecommunications world: When IBM released OS/2 Warp 3.0, it added HyperAccess Lite to the mix (as part of the BonusPak), and suddenly everything changed for OS/2 communications packages.

For one thing, this put an extra burden on Pmcomm. Users must ask: Is it appreciably better than HyperAccess Lite, enough to warrant spending \$99.95 on additional software? The answer depends on your needs.

Pmcomm is primarily geared toward personal users and contains no support for networking (beyond OS/2 Lan Manager's serial-port sharing). Only 29 modem configurations are provided; if your modem is not supported, you must either manually configure the modem or find

a similar modem configuration and pray that it works.

Pmcomm's internal scripting language also suffers from the personal-user focus. The language has only ten commands, and these center around the most basic communications tasks, such as logging on and off a remote host. Fortunately, you can augment the Pmcomm language with REXX and C library commands; the commands for uploading and downloading files according to a specific protocol are supported by REXX, for example. Even with these supplements, however, Pmcomm's scripting environment probably isn't robust enough for the corporate user.

MATCHING THE AUDIENCE

On the flip side, Pmcomm's emphasis on the personal is not necessarily a bad thing; anyone who has waded through a massive manual in search of a simple command knows this. Installing Pmcomm is painless, requiring only the names of destination directories and a

password if you plan on running Pmcomm in host mode. As an OS/2 application, Pmcomm supports nifty features like drag-and-drop, and heavy BBS users will appreciate the numerous sorting mechanisms for the dialing directories—there are nine different fields in all.

Most individual users won't even need to muck about with scripts, because Pmcomm can learn a script by following a user's keystrokes. And the very presence of a scripting language puts it ahead of HyperAccess Lite, which lacks such capabilities altogether. Most users will benefit from a scripting language (even if it is only to automate logging on and logging off), which makes Pmcomm a viable option.

Pmcomm also benefits from an attractive interface design. Frequently used functions can be accessed directly from a toolbar. Well-organized menus allow you to change configurations easily—virtually everything in Pmcomm can be changed, including the toolbar, keyboard, mouse, and macro configurations. You won't need to spend much time in the help files, which as it happens is a good thing. The help files are identical to the printed documentation, which in

► FACT FILE

Pmcomm, Version 2.30

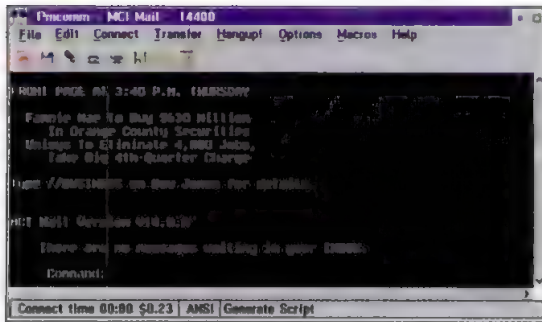
List price: \$99.95. **Requires:** 1MB hard disk space, OS/2 2.0 (with the Service Pak) or later. **In short:** Pmcomm is an attractive package with modest functionality compared with most of the other programs reviewed here. Its functionality is, however, superior to that of other packages with the same "less is more" attitude, such as OS/2 Warp's HyperAccess Lite. For example, Pmcomm has a scripting language that's capable of learning and recording user keystrokes; you can also augment its internal scripting language with REXX and C library commands.

Multi-Net Communications, 15702 Black Bear Ct., Klamath Falls, OR 97601-9008, 800-235-7789, 503-883-8099, fax, 503-883-7879

446 on reader service card

SUITABILITY TO TASK

	Power	Ease
Setup and configuration	POOR	FAIR
General data communications	FAIR	FAIR
E-mail and BBS front ends	FAIR	FAIR
Scripting	GOOD	FAIR



Procomm's terminal features a useful toolbar as well as a mechanism for tracking phone expenses.

turn leaves a lot to be desired.

So, getting back to the question posed at the beginning of this review: Is Procomm worth \$99.95, given the presence of HyperAccess Lite in OS/2 Warp? The answer is a qualified yes: The scripting language and configuration options make Procomm a suitable tool for most personal users and a more robust package than HyperAccess Lite.

Datastorm Technologies Inc.



EDITORS' CHOICE Procomm Plus for Windows 2.0

BY JOE SALEMI

Impressive power at a price is perhaps the best way to describe Version 2.0 of Datastorm Technologies' Procomm Plus for Windows. Datastorm has taken a giant step forward featurewise and pricewise with this popular communications program, which lists for \$179.

Among its many new features are automatic modem detection, fax support, and an improved terminal interface that makes intelligent use of the right mouse button and status bar. Procomm also comes with full-featured scripts for CompuServe and MCI Mail that let you work off-line. The package even has intelligent support for dial-in access and long-distance codes: Enter your local area code during setup and Procomm will automatically determine if it needs to dial access codes for any outgoing call.

A SETUP PRO

Procomm's setup program checks your system for available COM ports. Procomm then tries to identify the brand and model of modem you have connected

from the more than 750 models listed in its definition file. We found the program to be pretty accurate; if it couldn't determine the precise model, it usually got the correct brand. Updated modem definition files are available on Datastorm's BBS and CompuServe forum. The automatic modem detection routine can be run at any time from the program's setup option, so you still have this capability if you add or change

modems.

If you opt for Procomm's fax services, the setup program installs the fax driver as a printer driver. The module includes a nifty background receive program that sorts data calls from fax calls.

Routines for importing directories in ASCII—and from several other Windows-based communications programs—are built in to the dialing directory menu. You can designate directory entries as data, fax, or voice and can group entries together for easier management.

MASTERFUL LOGGING

Procomm comes with a master log-on script, from which it creates scripts for the individual services you use. When you run the master script, you're presented with a list of choices that includes most of the major on-line services.

Procomm also comes with completely automated scripts for CompuServe and MCI Mail that let you log on, download waiting messages, and then read and reply off-line.

Procomm's Aspect scripting language has over 1,000 commands and functions; the manual has a tutorial that does a pretty good job of teaching you to program in Aspect. Procomm compiles scripts to speed execution.

The status bar at the bottom of the screen displays the current terminal emulation, transfer protocol, modem configuration, speed, and parity. When you click on any of these, a pop-up list appears that

▶ FACT FILE

Procomm Plus for Windows, Version 2.0

List price: \$179; upgrade, \$69 **Requires:** 4MB RAM, 4MB hard disk space, Microsoft Windows 3.1 or later. **In short:** Procomm Plus for Windows has everything you need to get on-line quickly and successfully, including automatic modem make and model detection, a custom log-on script generator, and sophisticated off-line message managers for CompuServe and MCI Mail. Its fax send and receive capabilities make it an all-in-one communications manager for everyone from the novice to the experienced on-line service user.

Datastorm Technologies Inc., P.O. Box 1471, Columbia MO 65205, 800-315-3282, 314-443-3282, fax, 314-875-0595.

449 on reader service card

SUITABILITY TO TASK

	Power	Ease
Setup and configuration	EXCELLENT	GOOD
General data communications	EXCELLENT	GOOD
E-mail and BBS front ends	EXCELLENT	GOOD
Scripting	EXCELLENT	GOOD

lets you change the item on the fly. The rest of the bar displays modem status lights and a clock.

Right-clicking on the main terminal screen brings up a menu with such choices as sending and receiving files and positioning the terminal cursor. You can also add up to 10 custom items to this menu.

Procomm can handle the needs of anyone from novices to on-line junkies, including corporate users who need access to a central host.

HIGH PERFORMANCE

Procomm did quite well on our performance tests, scoring at or near the top in most of the categories. Its Xmodem implementation is a bit slow, but it makes up for that by outperforming all but Talk-

Thru on our Background Tasking test.

Other improvements to Procomm include the ability to edit the main toolbar, support for Caller ID and the IND\$FILE protocol, a full-featured host mode, and INT14, NetBIOS, NASI, and EBIOS network modem support. TCP/IP support is being developed for Version 2.1, which is scheduled to be

available by the time you read this.

Aside from its lackluster Xmodem performance, we have nothing but praise for Procomm Plus for Windows. It can handle the communications needs of just about anyone from novices to total on-line junkies, including corporate users who need access to a central host. Procomm Plus for Windows 2.0 may well be the program that finally lures you away from your DOS-based comm package.



Procomm Plus's Quick Select status line enables you to change communications parameters on the fly.

Mustang Software Inc.

• QmodemPro For Windows

BY JOE SALEMI

If you're looking for a package to handle your day-to-day communications needs efficiently, you should consider QmodemPro for Windows, Version 1.11. In this latest version of QmodemPro, Mustang Software has delivered impressive communications power in a simple, straightforward package.

Among QmodemPro's many strong points are support for RIPscript graphics, built-in (though limited) fax capabilities, and the ability to designate alternate phone numbers for on-line services. Although it doesn't support DDE, QmodemPro still has what the casual user wants.

GETTING SADDLED UP

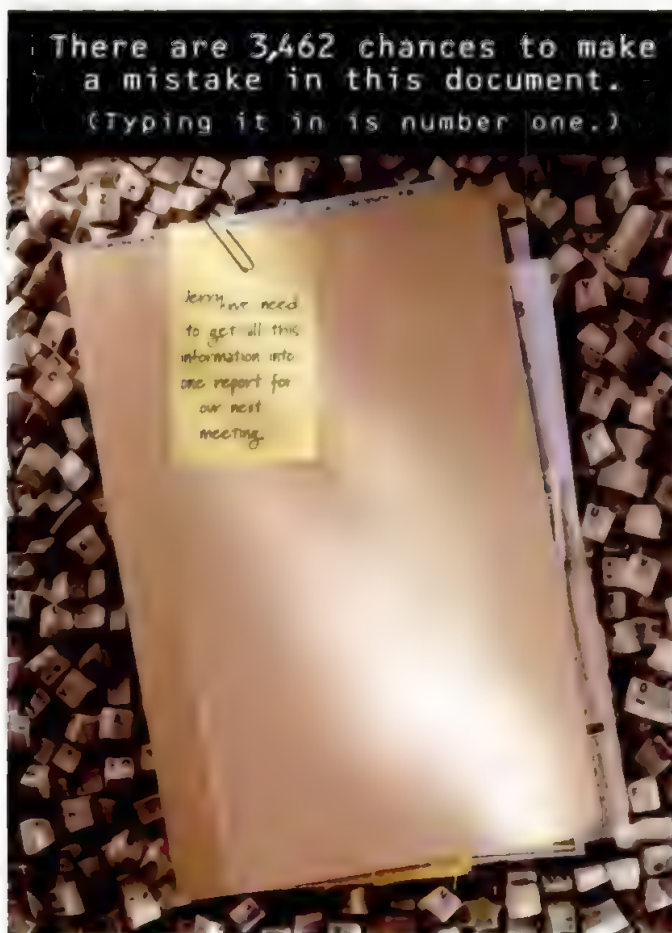
Getting up and running is extremely easy with QmodemPro. Setup strings for over 310

modems are provided, and Mustang constantly updates modem definition files and posts them on both its support BBS and CompuServe. Although the number of preconfigured scripts for on-line services is limited, the bigger services—CompuServe, GENie, and MCI Mail—are included. QModemPro also fully supports the RIPscript graphics found in BBSs.

To access common program functions in QmodemPro, you can use either the menus or the toolbar. The package also includes a full-featured dialing directory that can be viewed in three ways: text only, icon only, or a combination of both.

Each directory entry lets you set the default emulation and transfer protocol for the service, as well as user parameters, such as a log-on ID and password. You can also attach a short note to each entry to record additional details.

One directory feature that truly sets QmodemPro apart is the ability to store up to four alternative phone numbers for a service. If the primary number is busy, or doesn't answer after a user-defined num-



If the electronic office is here, how come people keep handing you pieces of typed paper, faded faxes, photo-copies and newspaper articles for you to include in your report? Even attempting to type it all in is a mistake. But it's got to be done one way or another.

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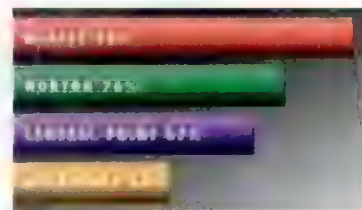
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▶ FACT FILE

**QmodemPro for Windows,
Version 1.11**

List price: \$99; upgrade, \$50 **Requires:** 4MB RAM, 5MB hard disk space, Microsoft Windows 3.1 or later
In short: QmodemPro for Windows is a good all-around communications program that can stand up to heavy daily use. It provides built-in support for all the major transfer protocols, RIPscip graphics, and sending and receiving faxes. QmodemPro can store up to four alternative phone numbers for a service in the dialing directory, which is useful for frequent BBS and on-line service dialers. The only major feature it lacks is DDE support.

Mustang Software Inc., 6200 Lake Ming Rd., Bakersfield CA 93306, 800-999-9619, 805-873-2500, fax, 805-873-2599

450 on reader service card

SUSTAINABILITY TO TASK

	Power	Ease
Setup and configuration	GOOD	FAIR
General data communications	GOOD	FAIR
E-mail and BBS front ends	GOOD	GOOD
Scripting	GOOD	FAIR

ber of calls, QmodemPro will automatically try the alternative phone numbers.

This feature can be especially handy when combined with a script. For example, you could create a group of all your on-line mailboxes and then create a script that will call each one (and keep calling it if necessary), download waiting messages, and log off. When you get back with your coffee, your messages will be ready to read.

A Windows-based version of Mustang's OLX off-line message reader is still under development, so QmodemPro for Windows doesn't yet have the mail-handling capabilities of its DOS sibling.

RIDING ON-LINE

On-line access is QmodemPro's forte—calling a service is as simple as clicking on the text name or icon in the directory. You can even set an option to tell QmodemPro to display the default directory automatically when you start the program. QmodemPro can directly convert and use directories created in the DOS versions of QmodemPro, Procomm, Telix, and Boyan 5.x—a convenient op-

tion for recent Windows converts.

For getting through tasks quickly, QmodemPro lets you assign up to 40 keyboard macros (per dialing directory) to the numeric keys in combination with Alt, Alt-Ctrl, Alt-Shift, and Alt-Ctrl-Shift. A toolbar across the bottom of the screen gives you access to the macros.

The included SLIQ (Script Language Interface for QmodemPro) is based on BASIC and is very easy to use. Most users probably will find the built-in QuickLearn feature sufficient for creating scripts for common tasks.

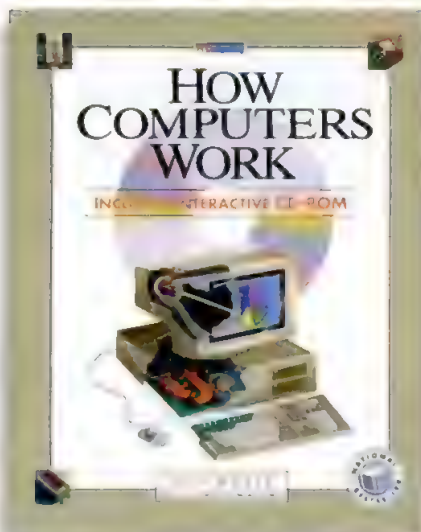
QmodemPro's built-in fax support is fairly sophisticated; directory numbers can be designated fax-only, and the program can automatically receive and store incoming faxes. But the package doesn't have indicator lights to let you know if you're sending or receiving.

The base package supports only the INT14 networking protocol. If you need NASI support, you'll need the QmodemPro for Windows Network 5-pack (\$399).

QmodemPro does, however, have built-in support for all the major transfer

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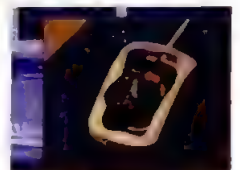
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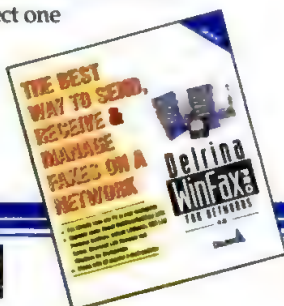


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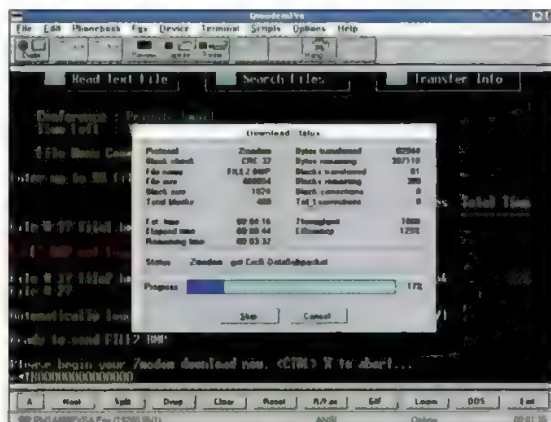
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The transfer window in QmodemPro gives you a wealth of information about the current file's transfer status.

protocols. And it was the fastest package on our Xmodem-1K Transfer test, the second-fastest for the Kermit Upload test, and in the top half on the rest of the tests.

The limited number of preconfigured scripts included in QmodemPro was disappointing, but only slightly. What we felt the package really lacked was DDE support. If you don't need that, you'll find QmodemPro to be more than capable of handling your everyday communications needs.

Relay Technology Inc.

• Relay/PC 6.0 for Windows

BY STEVEN C. M. CHEN

The \$99 Relay/PC 6.0 for Windows (which includes FaxWorks 3.0) is a communications package with the potential to please a wide range of users, from novice to old hand. But a few of the package's rough edges need to be worked out. For example, it could use a built-in editor and a compiling option for scripts.

If you're communicating mostly between PCs and midrange or mainframe systems, the \$299 Relay/Gold may be a better fit; it includes a larger selection of terminals and printer emulations.

Those new to communications probably will welcome Relay/PC's manual, which provides detailed information and good examples. A quick-start card and a reference card for scripting are also included. On-line help is abundant via either a hot-key or Help button. Relay/PC even offers you hints on what to do next.

Installation—using either the full or the custom option—is easy, but the install routine doesn't supply details such as disk

space requirements. Nor is there an automatic modem detection feature; it's up to you to set the ports and choose a modem setting from a selection of over 150.

NEWFANGLED CONNECTIONS

Relay/PC doesn't use a phone book for dialing entries. Instead, you get connection files. These are arranged into five categories—on-line, BBS, other computers, Relay/PC, and TTY-to-host (each is associated with a different file extension). Relay/PC's standalone Operator lets you create customized

log-on scripts for connection files. It essentially functions the way a directory-assisted call does when you place a voice phone call.

The process of adding connection files exemplifies Relay/PC's uneven usability. Though the Operator idea works great, accessing it isn't that straightforward. Beginners who need to make changes to communications parameters, for example, may feel they're lost in a maze. But if you need to find a BBS number, you're in luck. Relay/PC's directory lists more than 3,000 BBSs by area code.

ICONOGRAPHY

Relay/PC has a typical Windows interface with icons across the top and a status line at the bottom. The status line doesn't, however, provide any information on settings, nor are there any modem indicator lights: Information on modem status is available via one of the menu selections.

Relay/PC's QUIC buttons let you customize the interface by creating dedicated task icons that reside in a floating menu. In theory, you can create up to 576 QUIC buttons, assigning a script command to each.

Relay/PC's scripting feature could use some enhancements: First, it needs a built-in editor. As it stands now, you have to rely on your own editor, and the problem is that too little scripting help is available. (Relay/PC's only on-line scripting reference is in the QUIC-button configuration.) Second, Relay/PC doesn't have a compiling feature, and the learn mode only records keystrokes.

An extensive selection of file transfer protocols, terminal emulations, and net-

work protocols is included. But changing settings is slightly more work than it should be. For example, a package like HyperAccess will let you make changes directly from the settings window. Relay/PC sends you to the Modify command, then to the settings window, and then to the advanced

*If you need to find a
BBS phone number,
you're in luck.*

*Relay/PC's directory
lists more than 3,000
BBSs by area code.*

features list, where you have to choose what you want to change. Although this works, it's more cumbersome than the process is in other programs.

MEETING THE TEST

Relay/PC inappropriately set the transmission rate for our test modem to 4,800 bps; we had to create a "user-specified"

▶ FACT FILE

Relay/PC 6.0 for Windows

List price: \$99 **Requires:** 2MB RAM (4MB recommended); 3.5MB hard disk space, Microsoft Windows 3.1 or later **In short:** Relay/PC is a communications package that's both easy to use and challenging—depending on which features you're using. Adding phone entries or finding phone numbers from its list of over 3,000 numbers is easy and straightforward. Novices can count on the hints for some basic help with communications. You can also use the QUIC buttons to customize the package. But the advanced features and scripting could use improvement.

Relay Technology Inc., 604 Spring Hill Rd., Vienna, VA 22182; 800-795-8674, 703-506-0500, fax, 703-506-0510

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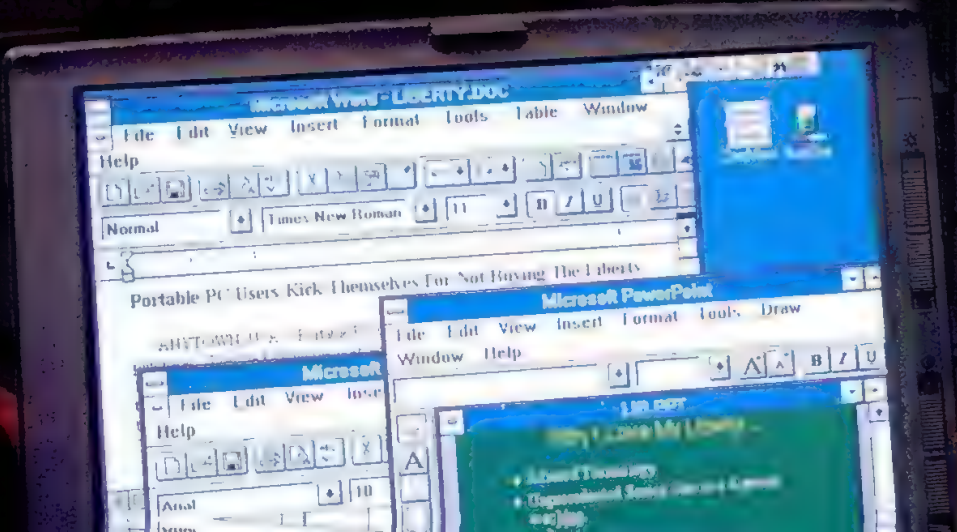
SUITABILITY TO TASK

	Power	Ease
Setup and configuration	GOOD	FAIR
General data communications	GOOD	FAIR
E-mail and BBS front ends	FAIR	GOOD
Scripting	GOOD	FAIR

**We interrupt "As The
Hard Drive Turns" for
breaking news from the
portable PC industry.**

**GA
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Reporter: We have an exclusive interview today with a person who wishes to be identified only as John Doe. Now tell me John, is it true you purchased a portable PC from one of those "other" companies?

John Doe: Yes sir. I'm afraid it is. I'm so foolish. I settled for a portable PC with a tiny 8.4-inch screen, a 250MB hard drive and minimum software applications. It sounded good at the time, but that was before I knew about the 4.2-pound Liberty™ from Gateway 2000.* Its impressive 10.4-inch screen has 53 percent more active viewing area than the 8.4-inch screen and it features amazing infrared technology that lets you use many cool IR features including wireless transfer. I'll still be transferring files with those darn cables while Liberty users can simply beam files back and forth

leather carrying case and Microsoft® Office Professional. How could I have been such a sap? I relish the thought of having a Liberty for about the same price. Now I have to enroll in the Portable PC Protection Program and start a new life. If only I had gotten the Liberty from Gateway 2000!

Reporter: Well, there you have it. This is just one of many portable PC buyers distraught because they bought a PC from one of the "other" companies. Remember, the Liberty is the latest and greatest development in portable computing. Unless you want to end up like this poor fellow, don't settle for anything less than a Liberty from Gateway 2000. Call them today! We now return to "As The Hard Drive Turns"

The Exclusive Story In Portable PCs!



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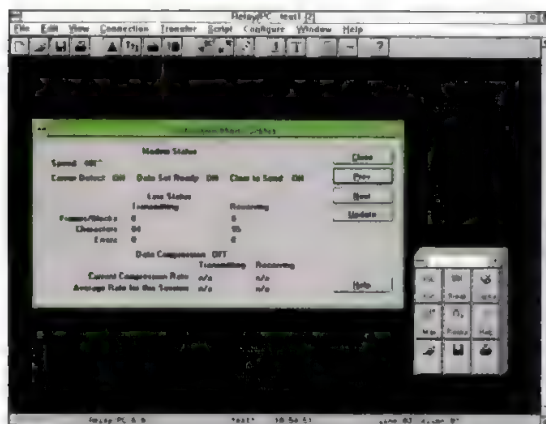
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Relay/PC's toolbars at the top and bottom of the screen offer nearly every connection and transfer option you need.

modem to correct this (it should be fixed in a subsequent release). Once we had dealt with the problem, Relay turned in generally excellent test results, except on the Kermit Upload test, where it came in among the slowest products we tested.

With some fine-tuning, Relay/PC should be easy to use. If you can overlook a few shortcomings, it's a package that gets most jobs done adequately.

Hayes Microcomputer Products Inc.

Smartcom for Windows

BY STEVEN C. M. CHEN

Multilanguage support and a highly intuitive and customizable user interface are the most distinguishing traits of Hayes Microcomputer Products' Smartcom for Windows, Version 1.1. But perhaps more importantly, the \$79 Smartcom includes easy-to-use script-writing tools and a full-function learn mode that makes basic scripting even easier. Smartcom's scripting language has fewer commands than those of some competing products, but its slick debugging features definitely enhance its potential as a development tool.

If you were to take a cross-section of users, Smartcom would likely satisfy a great many of them. Though easy enough for the novice, it's still powerful enough for the midlevel programmer.

Enhancements to this latest revision of Smartcom include support for RIPscript graphics and Winsock, which lets Smartcom access TCP/IP and other network connections. The package also offers a rudimentary unattended host mode (called Remote Access Script). Although

fax capabilities aren't inherent to Smartcom, Hayes offers the \$149 Smartcom Data/Fax Pro for those who want them.

Smartcom provides both easy and custom installation options. Whichever you choose, you need to specify your COM port and modem; there is no automatic detection (though the package can identify the model of a Hayes modem). The standard file-transfer protocols and terminal emulations are included. Smartcom supports NASI, INT14, and NetBIOS network protocols—as well as the Hayes

ISDN System adapter, Hayes Enhanced Serial Interface, and ESP communication accelerator. One unusual feature is multiple (human) languages support: You can run the package in English, Spanish, Italian, French, or German.

Several preconfigured scripts are included for accessing on-line services such as CompuServe and GENie; oddly enough, there isn't one for MCI Mail. Although these scripts are fairly basic, they do the job and are more sophisticated than those found in A-Talk for Windows.

NOT JUST A PRETTY FACE

Smartcom takes interface customization to new levels. First, you'll notice that Smartcom's toolbar is at the bottom, not the top, of the screen. This bar holds up to 100 icons, called SmartButtons. You can display the bar vertically or horizontally or hide it altogether.

The icons themselves can be linked to virtually any function or series of functions the program is capable of executing. Specific tasks for which Smartcom provides ready-made icons include Start Connection, Send Files, Receive Files, Printer Capture, and AutoText File.

Button Set lets you compose and call up discrete alternative toolbars. Need to run another application in a hurry? With Run Application, you can assign a button to launch it. The interface also provides a status bar where you can choose to display (textually) your three favorite status indi-

FACT FILE

Smartcom for Windows, Version 1.1

List price: \$79. **Requires** 2MB RAM, 3MB hard disk space, Microsoft Windows 3.1 or later. **In short:** This above-average communications package gives users a fully customizable user interface via its adjustable toolbar. Anyone looking for powerful scripting who doesn't want to program should take a close look at Smartcom. The on-line help is excellent, a boon for those who want to write scripts. But the scripting language, SCOPE, could use a few more commands; Hayes could also stand to make the phone book feature and its very rudimentary host mode more customizable.

Hayes Microcomputer Products Inc., P.O. Box 105203, Atlanta, GA 30348, 800-874-2937, 404-441-1617; fax, 404-444-1213

452 on reader service card

SUITABILITY TO TASK

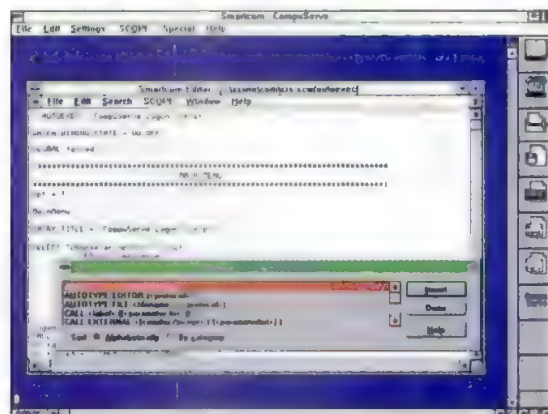
	Power	Ease
Setup and configuration	GOOD	GOOD
General data communications	GOOD	GOOD
E-mail and BBS front ends	FAIR	GOOD
Scripting	GOOD	GOOD

cators (out of Smartcom's choice of ten).

Smartcom's calling directory, which is akin to the phone book in other programs, is easy to use—setting up an entry is straightforward. But it's not quite as advanced as phone books in some other packages. For instance, you can't attach notes to the entries as you can in QmodemPro. But the feature gets the job done.

MORE LANGUAGE SKILLS

As the name implies, SCOPE (Simple Communication Programming Environment) offers fewer scripting commands



Finding SCOPE scripting commands is easy in Smartcom—just look them up in the on-line reference.



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than some other communication packages, such as Procomm Plus. But few other packages can match its learn mode ability to record user actions instead of just keystrokes. This makes writing simple scripts almost painless. Furthermore, Smartcom's on-line scripting reference presents a list of all the available commands, any of which you can insert into your script at the click of a mouse button. A compiling option is standard with SCOPE.

A speedy performer, Smartcom finished on top on our Kermit Upload test and also did well on the Screen-to-Screen Buffer Capture and Xmodem-1K Transfer tests. It was slightly slower on the Background Tasking test, though.

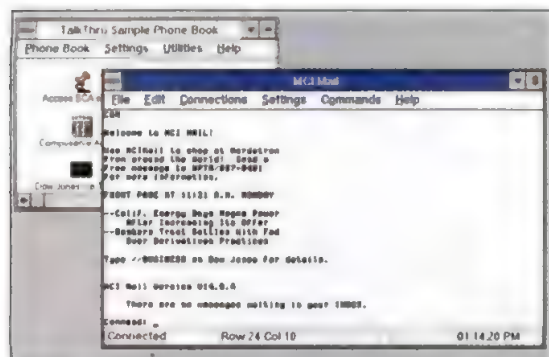
Smartcom is a competent comm package for generalists and one that most users will learn to like. Yet Smartcom's powerful (and easy) scripting also makes it suitable for the midlevel developer who needs to build basic custom applications.

Software Corp. of America Inc.

• TalkThru for OS/2 • TalkThru for Windows

BY KEVIN REICHARD

Using TalkThru for Windows, Version 1.03, or TalkThru for OS/2, Version 2.3, as a general-purpose communications tool is a bit like using a dump truck to haul a flowerpot across town. As a programming environment, however, TalkThru excels, making it a strong choice on multiuser systems that need to coordinate data exchange between PCs, minicomputers, and mainframes. Although a communications package usually isn't thought of as a programming environment, this frame of reference works best when evaluating TalkThru.



Connecting via the phone book entries in TalkThru is as simple as clicking on one of the icons you've defined.

With its powerful programming language, Autopilot, TalkThru is best suited for corporate MIS professionals who need to manage information flow in a mixed-vendor, mixed-OS environment. (The Windows and OS/2 versions of TalkThru are practically identical; they differ only in some cosmetic variations in the interface and in the level of networking support offered.)

TalkThru's roots are in the IBM 3270 connectivity world; as an extension of this world, TalkThru truly shines. The tradeoff is weakness in other networking tools: The Windows version supports only NetBIOS and INT14 among mainstream networking schemes; the OS/2 version supports NetBIOS, TCP/IP, and some OS/2-specific networking schemes.

SPEAKING THE LANGUAGE

The Autopilot language encompasses over 120 functions and does everything you'd expect from a full-blown programming tool. On one level, it handles the nuts and bolts of advanced communications and incorporates DDE support. On a higher level, Autopilot can be used for functions like controlling window sizes, passing variables from script to script, and creating self-generating dialog boxes and menus.

If this sounds complicated, it is. Though Autopilot has some similarity to the C programming language, it's really more akin to other higher-level scripting languages, such as TCL (Tool Command Language)—only with scads of telecommunications-specific statements. Even an experienced programmer will need time to get totally up to speed with TalkThru, as the Autopilot syntax can be confusing. And there's the larger issue of standardizing on a specialized language like Autopilot when other communications tools use more open and common languages. (Hyper-

Access for Windows, for example, uses the C programming language.)

BACK TO BASICS

This is not to say that TalkThru stresses programming at the expense of more basic

communications tools.

It supports all major file-transfer protocols, including Zmodem and CompuServe B+. It also has broad control over terminal configurations. Modem support, however, is middling (only 90 modems are preconfigured, and some popular modems—such as any from The

Complete PC—are missing from the list).

This means you can use TalkThru for such simple tasks as dialing into a BBS to grab e-mail, but accomplishing this may be more work than it's worth: The hefty man-

► FACT FILE

TalkThru for OS/2, Version 2.3

List price: \$350 (with VT340 capabilities; \$190 without) Requires: 750K RAM, 5MB hard disk space, OS/2 1.2 or later

TalkThru for Windows, Version 1.03

List price: \$150 Requires: 1MB RAM, 5MB hard disk space, Microsoft Windows 3.0 or later.

In short: TalkThru for OS/2 and TalkThru for Windows are virtually identical except for a few cosmetic differences and in the number of networking options available. Neither package will serve you as well as most of the other packages in this roundup, but the exemplary programming language, AutoPilot, makes these programs well suited for complex multipatform environments. Beware though. TalkThru's scripting language is complicated and difficult to master for a novice user.

Software Corp. of America Inc., 100 Prospect St., South Tower, Stamford, CT 06901, 800-966-7722, 203-359-2773; fax, 203-359-3198

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SUITABILITY TO TASK

	Power	Ease
Setup and configuration	GOOD	GOOD
General data communications	FAIR	FAIR
E-mail and BBS front ends	GOOD	FAIR
Scripting	FAIR	GOOD

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ual (which is also on-line) is dominated by documentation of the Autopilot language, and there's no tutorial for the novice.

Ironically, Autopilot doesn't work very well on simple tasks like downloading files. The relatively unstructured language is too difficult for a beginner to master, and it's not worth the effort of skimming through over 120 statements to find the ones needed. And some of the statements tend to be obscure. (More cross-indexes in the documentation would be greatly appreciated.)

In the end, novices would be better served by sticking with another communications tool or—in the case of OS/2 users—staying with HyperAccess Lite, part of the OS/2 Warp BonusPak. But corporate communications experts should consider using TalkThru as a development platform.

deltaComm Development Inc.

• Telix for Windows

BY KEVIN REICHARD

A war-horse from the DOS shareware world, deltaComm Development's Telix gallops onto the Windows jousting field as Telix for Windows, Version 1.01b (\$99). There's a lot to like in Telix for Windows, but it has an unfinished feel, and there are some irksome gaps that make it a questionable choice for casual communications users.

Though deltaComm has positioned

Telix as a general-purpose communications tool, the package is on the complex side for casual on-line usage, especially when compared with packages like HyperAccess or Procomm. Many of its distinguishing features seem slanted

toward hard-core BBS users.

Indeed, longtime Telix users will find in this Windows-based product the same features they've grown to rely on: phone-expense tracking (where you can chart your long-distance costs while dialing in to remote BBSs), the

amazing level of control over system configurations (virtually everything having to do with communications can be altered in some way), the flexibility of an unlimited number of phone book directories (each holding up to 1,000 entries), and the robust scripting tools, which contain a number of BBS-specific commands.

STICKING TO THE SCRIPT

In fact, Telix offers *two* scripting languages: SIMPLE, for basic chores like logging on to a BBS and grabbing a file, and SALT, for more advanced operations that require the depth and adaptability of a programming language (in this case, one closely modeled on the C language). Both languages are well explained in the documentation.

Longtime users will also be heartened by the addition of other BBS-centric features, such as RIPscrip support. Telix also offers support for 341 modem configurations, which makes installation relatively painless. (Telix detects available COM ports, but it's up to you to identify the modem you're using.)

BEYOND THE BBSs

The concentration on BBSs leaves some holes in Telix: Casual users may be put off by the lack of scripts for connecting to popular on-line services like CompuServe, Delphi, GENie,

► FACT FILE

Telix for Windows, Version 1.01b

List price: \$99 **Requires:** 2MB RAM (4MB recommended), 2MB hard disk space (6MB for full installation), Microsoft Windows 3.1 or later. **In short:** Telix for Windows evolved from a DOS-based BBS package into a Microsoft Windows-based telecommunications package. It still has a BBS-centered approach but has enough features to provide a modest level of functionality. Unfortunately, Version 1.01b feels a bit unfinished; users might benefit from waiting for the next iteration, which should be out by the time you read this.

deltaComm Development Inc., 507 Airport Blvd., #109, Morrisville, NC 27560, 800-859-8000, 919-460-4556, fax, 919-460-4531

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SUITABILITY TO TASK

	Power	Ease
Setup and configuration	FAIR	FAIR
General data communications	FAIR	GOOD
E-mail and BBS front ends	GOOD	FAIR
Scripting	GOOD	GOOD

and MCI Mail. To connect to these services, you need to set up your own dialing entries, complete with the correct connection parameters. Telix makes this task harder than it ought to be: You must somehow divine that you need to create a new, empty entry in a phone book and then insert the appropriate configuration information. (The documentation is a tad fuzzy about this process, as it is about many things needed by casual users.)

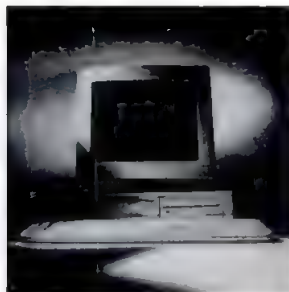
The version of Telix we reviewed, 1.01b, lacked some essential features, such as support for the CompuServe B or B+ and Kermit protocols. Also, we experienced numerous system failures when we downloaded files in the background while using other Windows applications in the foreground. Version 1.10, due out by the time you read this, should address many of our concerns. DeltaComm claims the new version will add support for the CompuServe and Kermit protocols and clear up the instability we experienced.

At \$99, Telix for Windows seems a reasonable value; interested customers can download a full working version from the deltaComm BBS or other on-line service and test-drive it free for 45 days. □



Telix has retained phone-expense tracking, which lets you chart long-distance costs while dialing in to remote BBSs.

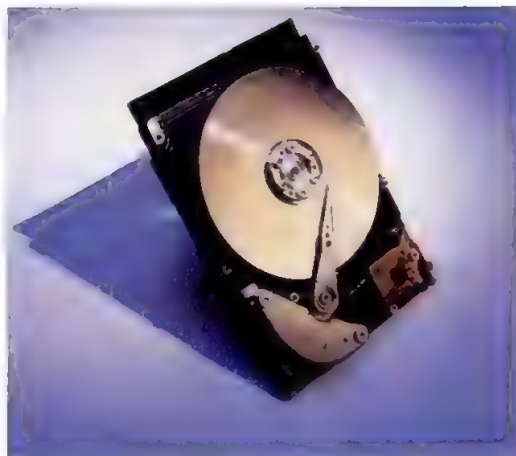
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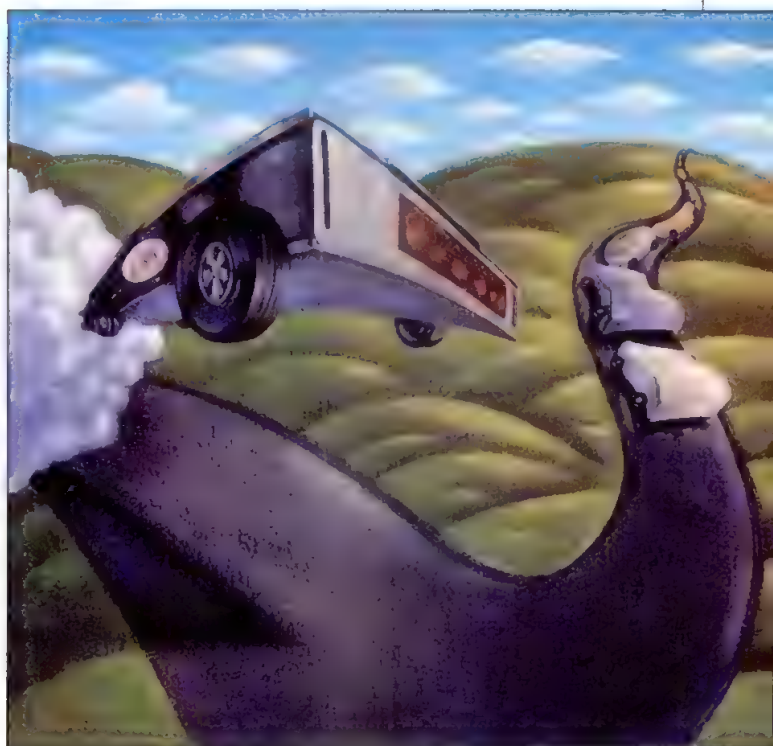
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V.34 MODEMS

V.34 Off the Starting Blocks



Almost while the ink was still drying on the V.34, companies were preparing to ship products. Here's a look at the first V.34 modems out the door.

By Earle Robinson

Don't blink. You might miss the next modem standard coming down the pike. But rest assured we won't. We were just wrapping up details of the roundup we published six months ago on V.FC and V.32terbo modems ("Hurry Up and Wait," September 13, 1994) when it was announced that the V.34 modulation standard had finally been ratified. We went right back in the labs to test the first standard V.34 modems out the door.

And here they are. We drove 16 V.34 modems through our exhaustive testing and analysis at our labs by about the first week of November. By the time this issue hits the stands, several more vendors will have V.34 modems on the street (see the sidebar "More Where They Come From").

GIVING THE DEVIL HIS DUE

Under ideal conditions, V.34 modems will signal at 28.8 Kbps, but they offer overall improved performance in addition to that speed. Their more powerful processors and better firmware mean V.34 modems will perform more reliably at lower speeds than older V.32bis modems. The signal-to-noise ratio (an important measure of quality and therefore reliability and throughput) is about ten times as fast at 9.6 Kbps with these new modems as with V.32bis modems.

These new capabilities prompted us to expand testing at ZD Labs to include more thorough measures of performance. We added tests that measure call-connect reliability (how quickly and reliably a modem connects with the modem at the other end), interoperability (how well a modem connects with other brands), and tests for

HIGHLIGHTS

V.34 Modems

V.34 HAS ARRIVED—and there are already modems to prove it. Just six months ago we rounded up V.FC modems, and we're back again to test the first crop of new V.34 modems.

ENHANCEMENTS ARE OFFERED by the V.34 standard—in addition to a 28.8-Kbps modulation standard—such as line probing, more channels to probe, and more symbol rates to choose from.

FASTER SPEEDS aren't the only thing you'll get with V.34. The V.34 modems perform better and more reliably than

V.32bis modems and have a better signal-to-noise ratio. You can expect big improvements in analog filtering and in connection quality.

PRICES VARY WIDELY in the three modem market segments—high-, middle-, and low-end: from a high list price of \$1,095 to a low one of \$189. High-end modems cost more but offer more features, such as secure remote configuration and callback. Mid-range modems, priced lower than the high end, lack four-line leased-line support and may not have such extensive

security features as the high-end modems.

PERFORMANCE IS CRITICAL when choosing a modem; cost is not the only element to consider. This time around, we included a few new tests, plus our standard set, to fully evaluate the new standard bearers. Since we gathered the first set of modems, we expected to see some glitches—and we did. Because the products are in their infancy, firmware changed almost daily. Overall, as testing progressed and firmware was updated, things improved.

propagation and echo delay. (See our performance test results.)

The first modems we received (the first off the production lines) gave us lots of problems, but the companies worked hard to make their products more stable throughout testing. By the time you read this, V.34 modems should be ready for prime time. If you bought an early V.34 modem, you should contact the manufacturer to ask about an update.

WHAT YOU PAY FOR

The 16 modems we tested spanned the market. List prices ranged from roughly \$200 to \$1,100, with street prices lower.

High-end modems, such as the AT&T Comsphere 3810Plus and the Motorola V.3400, are packed with features: network bridging, multiple leased-line support, secure remote configuration, secure remote callback, and the assurance that most if not all *optional* features of V.34 are implemented. Many lower-cost modems don't

implement all of the symbol rates (the speed at which modems talk across the public switched telephone network, or PSTN) that are provided for the standard. Thus, a premium price might buy you a better chance of establishing optimal connections based on line conditions.

The larger amount of RAM available in high-end modems also can mean larger data dictionaries that improve the transfer of compressible data. Finally, high-end modems tend to have higher mean time between failure factory ratings.

Mid-range modems, such as the U.S. Robotics Courier V.Everything and the Hayes Optima 288 V.34/V.FC + FAX offer many but not all of the features of the high-end modems. They won't have four-wire leased line support, and the security for remote operation may not be as thorough.

Low-end modems vary enormously. Some have good features, such as flash ROM and asymmetric bit handling (which

allows the use of one speed and bit rate in one direction and a lower one in the other). They are likely to implement fewer symbol rates and fewer carrier frequencies. But performance is an area in which some do remarkably well.

STANDARDS AND NON-STANDARDS

Because the ITU (International Telecommunications Union, formerly the CCITT) standard V.34 was created by a committee, there is wide latitude for its implementation. More importantly, many features are optional, not mandatory.

V.34 is an international standard. Before it emerged from the long committee process, some companies—led by Rockwell, who, along with AT&T, is a predominant chip set maker—devised a proprietary modulation scheme called V.FC (also called V.Fast). V.FC provided experience in handling high-speed modems and allowed some companies to take a lead in the marketplace. But V.FC is a

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modulation that will not be improved. Modems in this review that have the Rockwell chip set are backward-compatible with V.FC. Many others are not.

V.34 also offers significant enhancements. The most important improvement is line probing: When V.34 modems are connected, they probe the line to diagnose its qualities and weaknesses. V.34 provides more channels to probe and more symbol rates to choose from. Once the optimum speed, symbol rate, and carrier frequency are mutually determined, the connection is made. You should get adequate performance even when the circuit is less than perfect.

THE SERIAL PORT

With the high speed offered by V.34, it is virtually obligatory to have your serial port equipped with a 16550 UART. This UART has extended buffers for incoming and outgoing data and reduces what is called interrupt latency. In other words, there are fewer interrupts required to process the same data.

Without the 16550 UART, you risk losing data, and foreground tasks may be slowed when transmitting data (see "The Art of UART" in "Hurry Up and Wait"). Though the 16450 will suffice for noncompressible data, compressible data pushes the serial port to and even beyond its limits. If you will be transferring compressible data, consider acquiring a serial board with a coprocessor. This will offload much of the work from the system's main processor and offer a better chance of achieving the 115.2-Kbps performance level that the manufacturers claim to offer.

A MODEM IS JUST A MODEM?

Generally, we found that you get what you pay for in these modems. Flash ROM, for example, increases the cost of the modem. But you'll appreciate being able to download code revisions rather than having to send the modem back for a replacement chip. A more powerful

• U.S. Robotics Courier V.Everything

We tested some of the first implementations of the nascent V.34 modem standard, and our tests revealed a wide margin between the modems that were ready for the market and those that were not. One modem

clearly stood out as we examined the price, performance, and feature set of this new modem breed.

The U.S. Robotics Courier V.Everything has a robust set of features. Flash ROM, useful LED and speed indicators, and some of the most comprehensive documentation—even an excellent quick-reference card—were included for \$595. The Courier was near the top in all of our performance tests. Also, unlike any other modem in the review, the Courier handles both of the recent high-speed standards, V.FC and V.32terbo, and performed admirably in our interoperability tests.

We give a strong honorable mention to the Practical Peripherals Pro-Class 288MT V.34. It had a decided edge over all other modems in perfor-

mance, and finished on top in our PSTN Simulation, Throughput vs. File Type, and Block Acknowledgment Delay tests. For \$379, its performance outdistances even much more expensive modems. We would like to have seen flash ROM and better LED and speed indicators. Such top-notch performance indicates, however, that Practical Peripherals has worked out many of the implementation problems expected with any new standard.

If you are looking for a high-end modem for critical network access and are willing to pay around \$1,000, both the AT&T Comsphere 3810Plus and the Motorola V.3400 had excellent performance test results combined with high-end features not found in other modems in the review.



micro-controller will improve file-transfer performance, too. Also important are technical support, a good manual, on-line help, and a method to diagnose connections for speed, symbol rate, and carrier to help resolve problems. You should also check with your communications software vendor to see if they support your new modem. Also, see "Do You Still Need Comm Software?" in this issue.

Here's a secret about V.34 modems: You often won't get a connection at the maximum speed, 28.8 Kbps. The reason is the public phone circuits, with their limited bandwidth, lose signal quality on longer local loops, on poor switches somewhere

on your local loop or on the loop at the remote end, and during the dreaded multiplexing, in which the phone company piggybacks several calls on the same circuit.

An even dirtier secret is that some modems will connect at a higher speed than they can maintain. Thus, you think you're at 28.8 Kbps, but in fact the modem has dropped back to 26.4, 24, or even 21.6 Kbps. Most modems don't show you what speed you are connected at, though some will record the initial connect speed. So if you have stability problems, force a connection at a lower-than-maximum speed. This may give you a more reliable session.

V.34 will evolve and new code upgrades will be offered. Improvements in line probing, based on users' experience, will be the first step. Discussions have begun to add 28.8-Kbps fax, using half-duplex V.34. Simultaneous transmission of voice and data is likely to be added, too, and perhaps a form of video and data. Beyond that, there will be ISDN.

Our Contributors: EARLE ROBINSON is an independent consultant with many years of modem experience. STEPHEN SATCHELL owns Satchell Evaluations, a consulting firm that has been testing modems since 1984. JEFFREY WITT is a senior project leader and JIM WOLF is a project leader at ZD Labs. TIM M. CRAWFORD is a technical analyst, TODD SPANGLER is an editorial researcher, and LESLIE WYGANT is a staff editor at *PC Magazine*. GAIL SHAFFER was the associate editor in charge of this story, and ROBERT P. LIPSCHUTZ was the project leader.

► **SUMMARY OF FEATURES**

V.34 Modems

In alphabetical order by company

■ = YES □ = NO

List price

General Features

Signal-converter (data-pump) manufacturer and model

Controller-chip manufacturer and model

Firmware version or date of firmware tested

AT firmware version command

Supports flash ROM

Supports Caller ID

Physical Characteristics

Dimensions (HWD, in inches)

Location of power switch

Location of voice-operation switch

Location of volume control

Leased-line phone jack

Alphanumeric display

Number of status indicators

Speed indicators

Includes UART serial card

Includes phone cable/serial cable

Protocols Supported

ITU data modulation standards (2,400 bps and higher)

Other high-speed data modulation standards

Synchronous data format

Error-control command sets

Data-compression command sets

Fax compatibility

Fax standards

Technical Support

Command-set reference card

Quick-reference card

Technical-support number

BBS number

Warranty

N/A—Not applicable. The product does not have this feature.

Archtek America Corp.	AT&T Paradise	Best Data Products Inc.	Boca Research Inc.	Cardinal Technologies Inc.	E-Tech Research Inc.	Hayes Microcomputer Products Inc.
SmartLink 2834A V.34 Fax Modem	Comsphere 3810Plus	Smart One 2834FX	V.34 28,800bps External BocaModem	Cardinal 28.8 Fax/Modem	Bullet 180E	Hayes Optima 288 V.34/V.FC + FAX
\$289.00	\$1,095.00	\$339.00	\$339.00	\$189.00	\$499.00	\$579.00
AT&T 1633 F08 AB	Motorola 68302FC25C	Rockwell R6882-21	Rockwell RC288DPI	Rockwell R6882	AT&T V.34	Rockwell R6882DPI
AT&T C882-280-5	AT&T DSP 10A	Rockwell L3902-57	Rockwell L3902U	Rockwell L3902	Motorola 68702	Motorola 68302
005A	A01.02.00	1.000-V34	1.000-V34	1.000-V34	V1015	5.1
AT+3	AT+V	AT+V	AT+V	AT+3	AT+V	AT+3
■	■	□	□	■	■	□
□	□	□	□	□	■	□
1 x 7 x 5	2 x 8 x 12	2 x 6 x 10	1 x 6 x 8	2 x 5 x 6	2 x 7 x 7	2 x 5 x 10
Back	Back	Back	Back	Back	Back	Back
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	Side	N/A
□	■	□	□	□	■	□
□	■	□	□	□	■	□
9	13	8	8	8	8	8
□	■	□	□	□	■	□
■	□	□	■	□	□	Optional
■	■	■	■	■	■	■
V.22bis, V.32, V.32bis, V.34	V.22bis, V.32, V.32bis, V.34	V.22bis, V.32, V.32bis, V.34	V.22bis, V.32, V.32bis, V.34	V.22bis, V.32, V.32bis, V.34	V.22bis, V.32, V.32bis, V.34	V.22bis, V.32, V.32bis, V.34
V.32terbo	V.32terbo, V.34	V.FC	V.FC	V.FC	V.32terbo	V.FC
■	■	■	□	□	■	■
V.42, MNP 2-4	V.42, MNP 2-4	V.42, MNP 2-4	V.42, MNP 2-4	V.42, MNP 2-4	V.42, MNP 2-4	V.42, MNP 2-4
V.42bis, MNP 5	V.42bis, MNP 5	V.42bis, MNP 5	V.42bis, MNP 5	V.42bis, MNP 5	V.42bis, MNP 5	V.42bis, MNP 5
Group 3	None	Group 3	Group 3	Group 3	Group 3	Group 3
Class 1	N/A	Class 1 and 2	Class 1 and 2	Class 1 and 2	Class 2.0	Class 1
■	■	■	■	■	■	■
□	■	□	□	□	□	□
818-812-9800	800-237-0016	818-773-9800	407-241-3088	717-293-3124	408-988-8108	404-441-1817
818-912-3980	813-532-5254	818-773-9627	407-241-1601	717-293-3074	408-988-3663	404-446-6336
2 years	2 years	2 years	5 years	Lifetime	2 years	2 years

Archtek America Corp.

SmartLink 2834A V.34 Fax Modem

The SmartLink 2834A V.34 Fax Modem, among the lower-priced modems of this group (\$289 list price), finished among the best in all categories of our performance testing. And it includes some useful features such as flash ROM, which makes code upgrading simple. The SmartLink 2834A is compact and is accompanied by a manual that is well written and seems complete (but the print is too small).

The SmartLink 2834A has a few other

drawbacks that you should consider. Although you can specify connection speeds, its LEDs do not display the speed at which a connection is made. We'd also like to see some diagnostic registers for troubleshooting. And Archtek has promised implementation of asymmetric bit handling in 1995.

The SmartLink 2834A uses AT&T chips, so it supports V.32terbo but not V.FC transmission. Naturally, the lower modulations all are supported for data communications, as are all those modulations necessary to fax at up to 14.4 Kbps. But only Class 1 fax commands are supported by the SmartLink 2834A.

Technical support is provided through

Archtek's BBS and a direct telephone call to the company. Fax-on-demand documents are also available. We'd like to see a more readable manual and we also miss on-line information about the connection. But considering the good price, the fine performance, and the flash ROM for easy code upgrades, the SmartLink 2834A is a reasonable choice if you can live with a few compromises.—All reviews by Earle Robinson

► **SmartLink 2834A V.34 Fax Modem.** List price: \$289. Archtek America Corp., 18549 Gale Ave., City of Industry, CA 91748-1338; 818-912-9800; fax, 818-912-9700; e-mail, smrtlink@aol.com.

Circle 425 on reader service card



Logicode Technology Inc. Quicktel 2814XV	Motorola Information Systems Group Motorola V.3400	Multi-Tech Systems Inc. MultiModem MT2834ZDX	Multi-Tech Systems Inc. MultiModemII MT2834BA-ISI	Practical Peripherals ProClass 288MT V.34	Supra Corp. SupraFAX-Modem 288	U.S. Robotics Inc. Courier V. Everything	U.S. Robotics Inc. Sportster 28,800 Data/Fax	Zoom Telephonics Inc. Zoom/Fax-Modem V.34X
\$279.99	\$895.00	\$349.00	\$849.00	\$379.00	\$229.95	\$595.00	\$339.00	\$299.00
Rockwell RC288DPi	Motorola 56002	AT&T DSP 33x	AT&T DSP 33x	Rockwell R6682-21	Rockwell RC288DPi	U.S. Robotics	U.S. Robotics	Rockwell RC288DPi
Rockwell L3902-57	Motorola 68302	Zilog 182	Zilog 182	Intel MSH S-80C32U-44	Rockwell L390	U.S. Robotics	U.S. Robotics	Rockwell RC 288 ACi L3902-57
1 000 V34	1 02 02	11/8/94	11/8/94	2.5	1 000 05-V34	8/26/94	9/2/94	1 0008-V34
ATi3	AT&V	ATL5/L7	ATL5/L7	AT&V	ATi3	ATi7	ATi7	AT&V
■	□	□	■	□	■	■	□	□
■	□	□	□	■	■	□	□	■
2 x 6 x 6	2 x 7 x 10	1 x 4 x 6	2 x 6 x 9	1 x 5 x 7	1 x 5 x 7	2 x 7 x 11	2 x 7 x 4	2 x 6 x 9
Front	Back	Side	Back	Back	Front	Back	Top	Back
N/A	Front	N/A	Front	N/A	N/A	Front	N/A	N/A
N/A	N/A	N/A	Back	N/A	N/A	Side	Side	N/A
1	■	□	□	□	□	□	□	□
□	■	□	□	□	■	□	□	□
8	8	10	13	8	4	12	7	15
□	■	■	■	□	■	■	□	■
■	□	Optional	■	□	□	□	□	■
■ □	■ □	■ □	■ □	■ □	■ □	■ □	■ □	■ □
V 22bis, V 32, V 32bis, V 34	V 22bis, V 27, V 29 V 32, V 32bis, V 34	V 22bis, V 25bis, V 32, V 32bis, V 34	V 22bis, V 29, V 32, V 32bis, V 34	V 32, V 32bis, V 34	V 22bis, V 32, V 32bis, V 34	V 22bis, V 32, V 32bis, V 34	V 22bis, V 32, V 32bis, V 34	V 22bis, V 32, V 32bis, V 34
V.FC	None	V.32turbo	V.32turbo	V.FC	V.FC	V.32turbo, V.FC	V.FC	V.FC
■	■	□	■	■	■	■	□	■
V 42, MNP 2-4, 10	V 42, MNP 2-4	V 42, MNP 3, 4	V 42, MNP 2-4	V 42, MNP 2-4	V 42, MNP 2-4, 10	V 42, MNP 2-4	V 42, MNP 2-4	V 42, MNP 2-4
V 42bis, MNP 5	V 42bis, MNP 5	V 42bis, MNP 5	V 42bis, MNP 5	V 42bis, MNP 5	V 42bis, MNP 5	V 42bis, MNP 5	V 42bis, MNP 5	V 42bis, MNP 5
Group 3	Group 3	Group 3	Group 3	Group 3	Group 3	Group 3	Group 3	Group 3
Class 1 and 2	Class 1	Class 2	Class 2	Class 1 and 2	Class 1 and 2	Class 1 and 2 0	Class 1	Class 1 and 2
■	■	■	■	□	■	■	■	■
■	■	■	□	■	■	■	□	□
805-388-9000, ext. 555	800-221-4380	800-972-2439	800-972-2439	805-496-7707	603-967-2490	800-550-7800	708-982-5151	817-423-1076
805-445-9633	508-261-1058	612-785-3702	612-785-3702	805-496-4445	503-967-2444	708-982-5082	708-982-5082	817-423-3733
Lifetime	2 years	10 years	5 years	Lifetime	5 years	2 years	5 years	7 years

AT&T Paradyne

• Comsphere 3810Plus

AT&T Paradyne's Comsphere 3810Plus, in addition to being one of the more premium modems tested, is the largest. It's about the size of a notebook PC but weighs less. This giant is packed with features, including a powerful LCD, diagnostics, flash ROM, and secure remote configuration. You will pay more, though—the Comsphere lists at \$1,095.

ZD Labs' tests revealed that the Comsphere has excellent call-connect reliability and network-model coverage. But there were mixed results for file through-

put. Although its bidirectional transfer of highly compressible files was among the fastest, those transfers for other types of files were bested by several modems.

On the plus side, the Comsphere offers thorough remote diagnostics, and highly secure remote configuration and callback to a single number. It has a watchdog timer to reset the modem in case of circuit failure. You can password-protect your configuration by software command or using the LCD, which provides connection and diagnostic reports.

Curiously, only a slim manual is included, with a quick-reference card; AT&T will send a full manual upon request. AT&T plans to add fax capability in 1995.

Among the Comsphere's direct competitors, the Motorola V.3400 showed better file-transfer performance and has Class 1 fax, but lacks flash ROM.

► **Comsphere 3810Plus.** List price: \$1,095. AT&T Paradyne, 8545 126th Ave. North, Largo, FL 34649-2826; 800-482-3333, 813-530-2000; fax, 813-530-2103; no e-mail. Circle 426 on reader service card

Best Data Products Inc.

• Smart One 2834FX

This modem is a mixed bag. For starters, we were surprised at its larger size, because the Smart One 2834FX is one of the lower-priced modems (\$339 list), and



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THE NEW COMSPHERE 3800Plus IT'S A NEW LEAGUE OF SURVIVAL SURVIVAL OF THE

Not to be competitive here, but nobody can go faster than AT&T Paradyne. Our newest modem, the COMSPHERE 3800Plus, transmits nearly 6000 more words a minute than the next quickest modem out there. And for the record, it's the first and only V.34 modem that is capable of operating at speeds up to 33.6 Kbps. Speeds that save you network and CPU on-line time. Making it the fastest modem in the whole wide world. As well as one of **Access the Globe.** the fittest. The COMSPHERE 3800Plus modem is certainly built like a Bell Labs champion. We based it on our award-winning 3800 Series. Made it software upgradeable over the PSTN. Added network management capabilities. And one of the most advanced security systems available. As a bonus, we'll even send you our AT&T Paradyne Network Management Demo Disk which enhances the performance of your network of 3800Plus modems.

To get more information on the COMSPHERE 3800Plus, winner of Data Communications' Hot Products award, and the free AT&T Paradyne Network Management Demo Disk, call 800 482-3333, ext. 723. We'd hurry if we were you.

CIRCLE 895 END USERS ON READER SERVICE CARD
CIRCLE 940 RESELLERS ON READER SERVICE CARD



AT&T Paradyne

Although we saw some differences in performance, line handling, and interoperability, mostly we observed a set of vendors struggling to deliver on a new modem standard—which is no easy task.

What the Numbers Mean

We were excited about the potential of these new modems. Most pointedly, we were interested in the doubling of the old V.32bis standard signaling rate to 28.8 Kbps, and a new negotiation standard that promises faster connections over poor phone lines.

But we expected some problems, too, in as much as we were looking at the first V.34 modems off the production lines. Indeed, some modems refused to work because of power-supply failures and part-installation problems, underscoring their newness. We also experienced a more familiar situation: something we've come to call "firmware du jour," where some vendors change their firmware daily to fix bugs. With each new upgrade came time-consuming and rigorous retesting by ZD Labs.

We observed that these modems did improve over the course of our testing cycle. Unfortunately, new firmware revisions were still coming in as testing ended. We advise you to check the firmware version in your modem and upgrade to the latest version. Flash firmware upgrades make this process much easier (see the Summary of Features to learn which vendors offer flash upgrades). By the time you read this review, we expect the V.34 products to have firmed up substantially, and we hope that you won't face the same battles we did. Here's what we found on specific tests.

TELEPHONE NETWORK SIMULATION

A good modem performs well over a large variety of line conditions and gradually degrades when faced with very poor line conditions. A poor

modem will not hold its performance over moderately noisy phone lines and drops off sharply as line conditions worsen. Start by looking at the product's aggregate score, but pay attention also to the shape of the curve (in the Network Model Coverage graphs) to get an overall picture of how the modem performed over the entire public switched telephone network (PSTN) simulation spectrum.

For the V.32bis modem tested for comparison, we see an almost straight horizontal line across the entire model, indicating a mature technology. The worst of the V.34 modems (Best Data,

ketplace. When looking at the top scorers on this test, compare their results with the numbers on the Call Connect Reliability test for consistency of performance.

MOVING DATA

On the unidirectional portion of our Throughput vs. File Type test, most of the modems performed similarly. Only the Boca V.34 28,800bps External BocaModem consistently fell behind the others. The AT&T Comsphere, among the leaders in our bidirectional testing, uses an AT&T DSP with a Motorola CPU that is capable of rates in excess of 28.8 Kbps. We actually saw connection rates as high as 31.2 Kbps.

CONNECT!

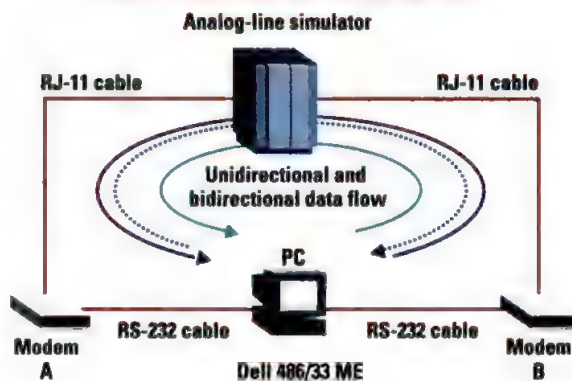
When you place a call, you want your modem to connect successfully and quickly. To evaluate these modems, look at both the average time required and the percentage of times the

modems successfully connected. Our Call Connect Reliability test showed the AT&T Comsphere and Motorola modems connecting 100 percent of the time. But both generally took longer to connect than other top performers. The Archtek SmartLink also connected 100 percent of the time, while achieving quick connection times.

DELAYS, DELAYS, DELAYS

There is a growing trend away from straight file transfers in BBS-style environments toward the use of protocol front ends for commercial systems or remote-to-LAN links from remote laptops to home databases. This shift changes the performance emphasis from raw data throughput to real-time considerations such as propagation delay and how fast an information exchange actually happens. The Cardinal, Practical, and Supra modems had the smallest round-trip delays on our Block Acknowledge Delay test.
—Analysis by Robert P. Lipschutz, Jeffrey Witt, and Jim Wolf

V.34 Modem Test-Bed

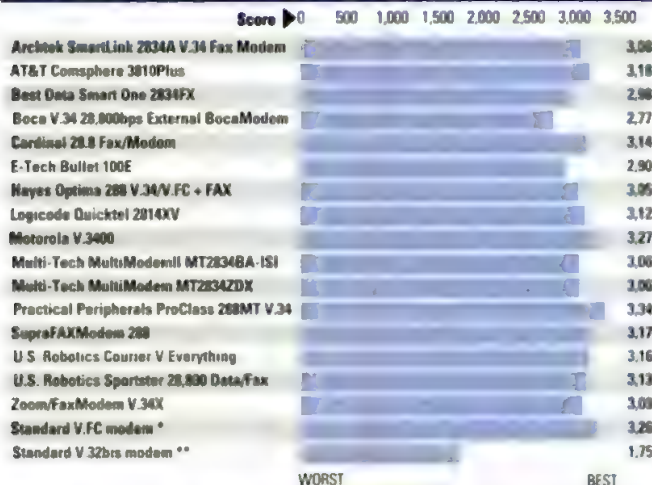


Boca, E-Tech), however, overall would transfer more data over a sample of calls than the V.32bis modem. In other words, they would do no worse than the V.32bis and potentially better when connecting to another V.34 modem.

We can see that initially the V.FC product offers better coverage than most of the V.34 products—Motorola's and Practical's products being two exceptions. This is probably another comment on the period of time the V.FC products have been in the mar-

Performance Tests: V.34 Modems

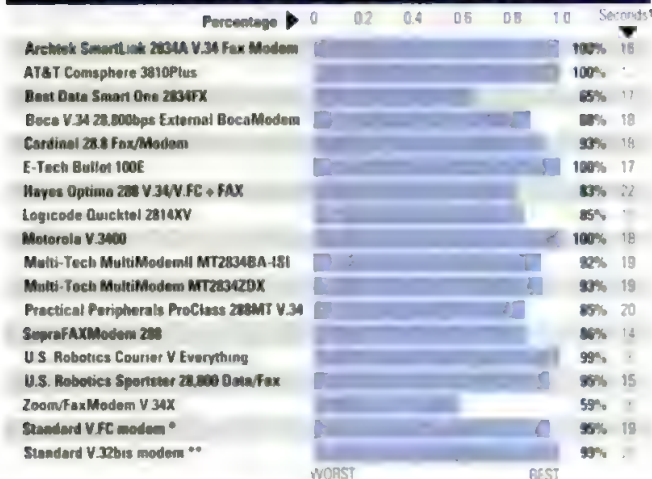
TELEPHONE NETWORK SIMULATION



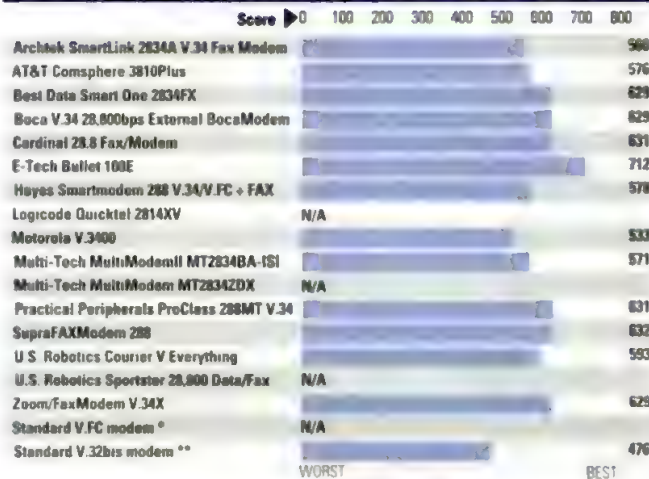
THROUGHPUT VS. FILE TYPE



CALL CONNECT RELIABILITY



BLOCK ACKNOWLEDGE DELAY



* Microcom DeskPorte FAST ** Practical Peripherals PM14400FXSA N/A—Not applicable The modem did not complete all portions of this test † Shorter times represent better performance

How We Tested

For the test scores above, our testing procedures were derived from the EIA/TIA Telecommunications Systems Bulletin 38, a rigorous set of tests designed to challenge a modem's hardware and firmware components. Our four tests measure, respectively, how well each modem works over the line conditions you are most likely to encounter in the public telephone network, how fast the modem transfers various file types unidirectionally and bidirectionally, how fast and how reliably the modem makes a successful connection, and the performance on a round-trip block transfer. We also performed extensive interoperability tests to see how any given V.34 modem works with other vendors' modems.

To simulate the real-life phone lines you'll encounter, we used a Telecom Analysis Systems (TAS) Model 240 Voiceband Subscriber Loop Emulator together with a TAS Series II Telephone Network

Emulator. In all, our network model coverage tests used 168 different line conditions representing 100 percent of EIA/TIA's model of the United States.

We loaded our test software—XFR, developed by Satchell Evaluations—on a Dell 486/33 ME. We sent data at 115.2 Kbps using a Hayes dual-port ESP board (NS16550 UART) through telephone network simulators either unidirectionally or bidirectionally, and recorded the throughput rate as data was received at the receiving serial port. The program also checked the integrity of the received data against the sent data to ensure that no bit errors were introduced.

We asked vendors to send modems with the most recent firmware and to provide information for us to create an initialization string that would make each modem perform at its highest potential. All except our interoperability tests involved the transfer of data between two identical external

modems from the same vendor.

Our **Telephone Network Simulation** test measures the effectiveness of the modem's line interface, V.42 error control algorithm, signal converter, and firmware in handling the wide variety of line conditions possible in our model of the PSTN. The 168 line conditions we used for this test comprise 100 percent of the possible line conditions in the model. The TAS simulators are configured according to the EIA/TIA committee's PSTN profile defined in the TSB 37A. For this test we transfer a highly compressible file with compression disabled. The data is transferred unidirectionally, once over the majority of the line conditions and several times over the most common line conditions.

Our **Throughput vs. File Type** test measures each modem's performance as it transmits files representing five different data types: highly compressible graphics, moderately compressible text,

INTEROPERABILITY TESTS

TELEPHONE NETWORK SIMULATION

Larger ratios represent better performance	Archtek (V.34)	Cardinal (V.32terbo)	Microcom (V.FC)	Motorola (V.34)	US Rob/Courier (V.34)
Archtek	1.00	0.87	0.56	1.10	0.72
AT&T	0.94	0.98	0.55	1.09	N/A
Best Data	1.04	N/A	0.95	0.84	0.90
Boca	N/A	N/A	N/A	N/A	N/A
Cardinal	0.36	0.75	0.97	1.04	0.83
E-Tech	0.90	0.76	N/A	1.04	0.35
Hayes	0.58	0.75	0.73	0.70	0.91
Logicode	0.72	0.75	1.00	0.83	0.90
Motorola	1.03	0.74	0.50	1.00	1.08
Multi/BA-ISI	1.01	0.99	0.13	1.06	0.89
Multi/ZDX	1.01	1.00	0.13	1.00	0.91
Practical	N/A	N/A	N/A	N/A	N/A
Supra	0.87	0.75	0.93	0.88	0.87
US Rob/Courier	0.90	0.96	1.03	0.94	1.00
US Rob/Sporster	0.89	0.74	0.77	1.00	0.93
Zoom	1.09	0.75	0.91	0.78	0.87

THROUGHPUT VS. FILE TYPE

Larger ratios represent better performance	Archtek (V.34)	Cardinal (V.32terbo)	Microcom (V.FC)	Motorola (V.34)	US Rob/Courier (V.34)
Archtek	1.00	1.09	0.65	0.96	1.04
AT&T	1.03	1.08	0.67	1.03	N/A
Best Data	0.56	N/A	1.03	N/A	1.03
Boca	N/A	N/A	N/A	N/A	N/A
Cardinal	0.31	0.19	1.03	0.72	1.02
E-Tech	0.96	1.09	N/A	0.98	0.70
Hayes	N/A	1.08	0.88	0.25	0.98
Logicode	1.32	0.29	N/A	0.6	N/A
Motorola	1.00	1.01	0.68	1.00	0.76
Multi/BA-ISI	1.04	1.13	0.66	1.01	1.01
Multi/ZDX	1.04	1.12	0.67	0.99	1.03
Practical	N/A	N/A	N/A	N/A	N/A
Supra	0.41	0.18	1.03	N/A	1.03
US Rob/Courier	1.05	0.74	1.05	1.03	1.00
US Rob/Sporster	1.05	1.09	1.05	1.02	0.99
Zoom	0.73	0.19	1.03	N/A	1.02

CALL CONNECT RELIABILITY

Larger ratios represent better performance	Archtek (V.34)	Cardinal (V.32terbo)	Microcom (V.FC)	Motorola (V.34)	US Rob/Courier (V.34)
Archtek	1.00	1.02	0.88	0.83	0.94
AT&T	1.04	1.03	1.03	0.92	N/A
Best Data	0.52	1.31	0.89	0.80	1.18
Boca	N/A	N/A	N/A	N/A	N/A
Cardinal	0.52	1.06	0.90	0.66	1.03
E-Tech	0.97	1.00	N/A	0.81	0.96
Hayes	0.30	1.19	1.04	0.82	1.04
Logicode	0.56	1.11	1.02	0.61	1.10
Motorola	0.97	1.00	1.03	1.00	0.99
Multi/BA-ISI	1.05	1.01	0.26	0.88	0.91
Multi/ZDX	0.87	1.00	0.30	0.92	0.89
Practical	N/A	N/A	N/A	N/A	N/A
Supra	0.80	1.09	0.95	0.76	1.05
US Rob/Courier	1.02	1.00	1.00	1.00	1.00
US Rob/Sporster	1.02	0.98	0.98	1.01	0.96
Zoom	0.67	1.21	1.04	0.85	1.16

BLOCK ACKNOWLEDGE DELAY

Larger ratios represent better performance	Archtek (V.34)	Cardinal (V.32terbo)	Microcom (V.FC)	Motorola (V.34)	US Rob/Courier (V.34)
Archtek	1.00	N/A	N/A	1.02	N/A
AT&T	1.00	N/A	N/A	1.04	N/A
Best Data	0.70	N/A	1.01	N/A	N/A
Boca	N/A	N/A	N/A	N/A	N/A
Cardinal	0.99	0.94	0.98	N/A	N/A
E-Tech	0.99	N/A	N/A	0.94	0.99
Hayes	N/A	N/A	N/A	N/A	N/A
Logicode	1.00	N/A	1.01	N/A	N/A
Motorola	1.02	0.89	0.88	1.00	1.03
Multi/BA-ISI	0.98	0.99	0.79	0.99	0.91
Multi/ZDX	N/A	N/A	N/A	N/A	N/A
Practical	N/A	N/A	N/A	N/A	N/A
Supra	1.00	0.94	1.00	N/A	N/A
US Rob/Courier	1.02	N/A	1.01	1.06	1.00
US Rob/Sporster	N/A	N/A	N/A	N/A	N/A
Zoom	N/A	0.94	1.01	N/A	N/A

N/A—Not applicable. This combination of modems did not complete all portions of the test. N/A—Not applicable. We did not test this combination of modems.

slightly compressible executable, noncompressible, and combination file. We conduct both unidirectional and bidirectional transfers of all five file types and report a composite score. The results reflect a vendor's implementations of V.42 error control, V.42bis compression, framing overhead, and dictionary.

Our **Call Connect Reliability** test probes the ability of the modem to make consistent connections repeatedly over representative models of each of the seven possible telephone company local loops. After conducting numerous iterations of these tests, we report the percentage of successful connections and the average time it takes for the modems to connect.

Our **Block Acknowledge Delay** test measures the round-trip time to send a block of 133 characters between two modems. It is designed to test the effects of buffering and V.42 and V.42bis algorithm decisions on response time.

For the Telephone Network Simulation, Throughput vs. File Type, and Block Acknowledge Delay tests, each reported score is a weighted average of multiple test results for the product.

Interoperability

Many of the modems purchased today are used to call "outside": to global mail services, Internet access providers, or commercial on-line services. So it is important to know how a given modem will perform with modems that use older signaling standards or modems from different vendors. To test how well each of the modems handled connections to different modems, we performed some interoperability tests.

None of the modems consistently connected with the five test modems at the highest speed under difficult line conditions. This is a repeat of the interoperability problems we saw when V.32bis was introduced over three years ago. The vendors cooperated to solve the problems then and they're doing it again now, but now it's clear that mismatched modem pairs might not make the fastest connections all the time. If you buy an early V.34 modem product, you may have to update the firmware in a few months to improve the interoperability or performance.

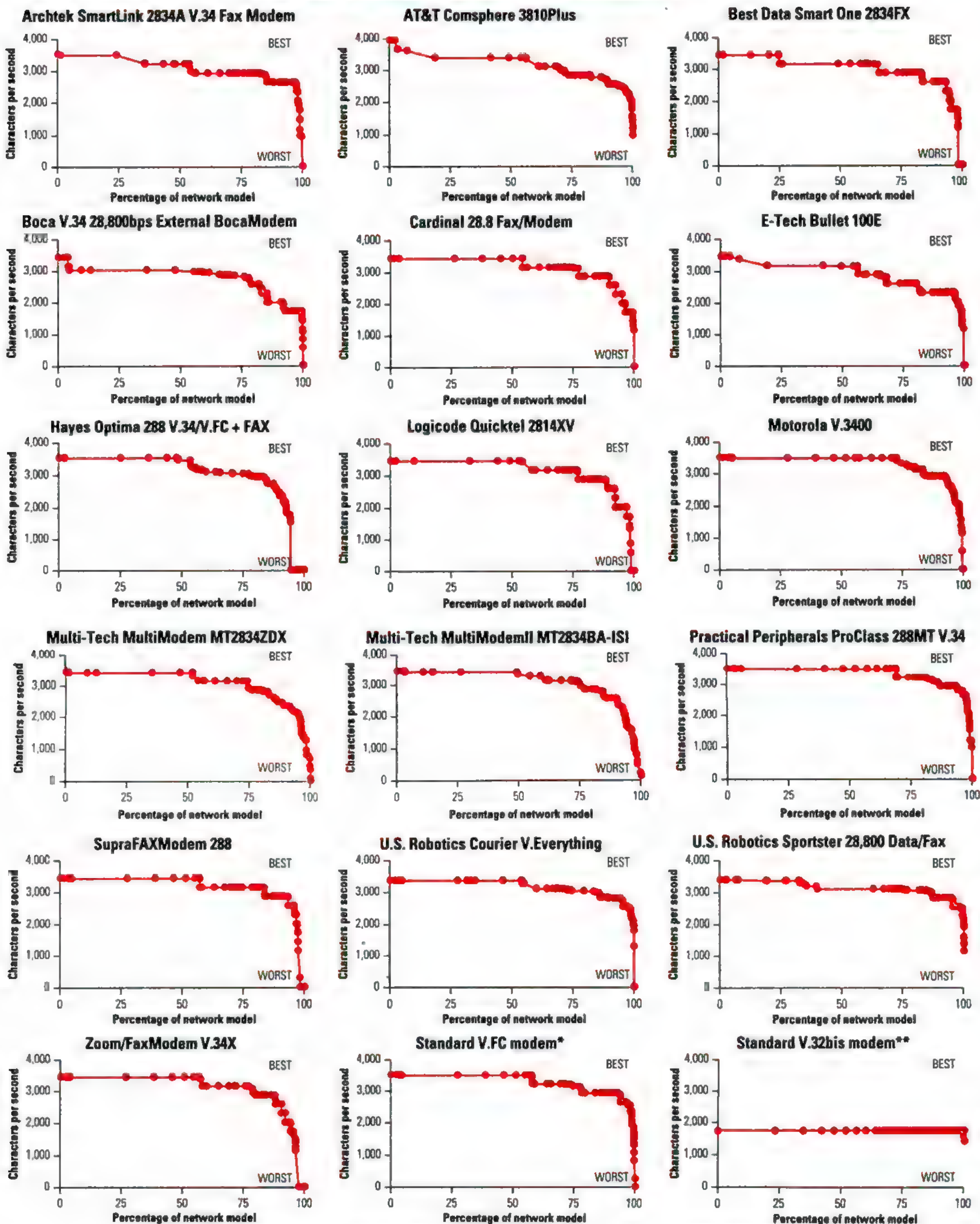
We used a subset of the standard test routines to measure each modem with five different modems:

three V.34 modems (Archtek SmartLink, U.S. Robotics Courier, and Motorola V.3400), a V.FC modem (Microcom DeskPorte FAST), and a V.32terbo modem (Cardinal MVP196E). We present four tables showing interoperability across a simulated telephone line.

On each test, we compared the score for each combination of modems against the score the worse of the two modems achieved (on the previous page), and we express the result as a ratio. We interpreted any ratio above 0.97 to mean good interoperability. The lower the ratio, the worse the interoperability. The notation "N/A" indicates that the combination of modems did not complete all portions of the test.

There are many such notations in the table, and frankly, these results reflect more on the status of the technology than on the work of any one company. We found in many cases that the modems simply refused to make connections. Some of the problems occurred when one modem thought it had negotiated compression while the other one didn't. In a couple of cases, the modems started but could not hang onto the connection long enough to complete the test.

NETWORK MODEL COVERAGE



* Microcom DeskPorte FAST.

** Practical Peripherals PM14400FXSA.

28.8K Internal, External And PCMCIA Modems From Hayes. Twice The Maximum Speed And V.34!

"Fastest Performance"
- PC WEEK 11/93
"Overall Speed Winner"
- InfoWorld 7/94
"Fastest Tested"
- BYTE 7/94
"Fastest Modem"
- Computer Shopper 7/94



Introducing our new V.34/V.FC OPTIMA™ modems with FAX. The internal, external and PCMCIA 28.8K modems that let you communicate at speeds up to twice as fast as other 288 modems.* We've maximized the full potential of V.42bis compression technology to help you communicate at speeds up to an incredible

230,400 bit/s!

Computer Publication Lab-Tests Prove It!

In the past year, OPTIMA 288 has swept the speed and performance awards for fastest modem and it's still capturing awards today.

OPTIMA 288 provides great solutions for remote LAN, multi-media, and transferring large files. Our OPTIMA 288B internal modem includes the

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New PCMCIA Modems With EZjack™! These 28.8K and 14.4K data and FAX modems feature EZjack, a durable internal, retractable RJ-11 connector that hooks easily to a standard phone cord. No cables - just convenience. It supports Hot Swap for plug and play, has Automatic Idle Mode which extends battery life by using 75% less power, and speeds up to 230,400 bit/s!

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Hayes
Increasing the Speed
of Business.



*Other 28.8 K modems have 4 to 1 data compression to achieve 115,200 bit/s. OPTIMA 288 has 8 to 1 data compression for 230,400 bit/s. The speed you achieve will be affected by your computer systems, communications software, and the compressibility of data being transmitted. To achieve maximum speeds, two Hayes OPTIMA 288 highspeed modems must be used. **Fastest in four out of five file transfer tests. CRN The Gallup Organization Inc. 1993. Hayes Online: 404-446-6336. In Canada call 800-429-3722. 1994 Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348.

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CIRCLE 136 ON READER SERVICE CARD

Our New 28,800bps Modems With XJACK® Are Revolutionary.



A PCMCIA modem that sends and receives data at 28,800bps is impressive. Unless connecting it slows you down.

V.34 With The XJACK® Connector

Unlike the messy external cables other PCMCIA modems require, XJACK® is a durable, built-in connector that hooks to any standard

phone cord at the touch of a finger. No cables attached.

If that sounds comforting, consider the added peace of mind that comes with true V.34 compliance — the only 28,800bps standard that guarantees universal compatibility. And remote updates via Flash DSP and Flash ROM



In the PCMCIA slot, XJACK® pops out for use and back in for travel.

Others Are Bound By Convention.



should also be reassuring.

Save Time And Money

Of course, 28,800bps also improves productivity by allowing you to communicate faster as well as send and receive complex documents. All

FEATURES

- V.34 Standard
- XJACK Connector
- Flash DSP, ROM
- High-Speed Drivers
- Digital Line Guard
- Hot Insertion
- 5-Year Warranty

the while cutting phone line costs by up to 50%.

But we didn't stop there. All Megahertz 28,800bps modems include high-speed drivers to optimize Windows performance, digital line guard and hot insertion.

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For info. on Megahertz modems, call 1-800-LINKING, ext. 4324.

 **Megahertz®**
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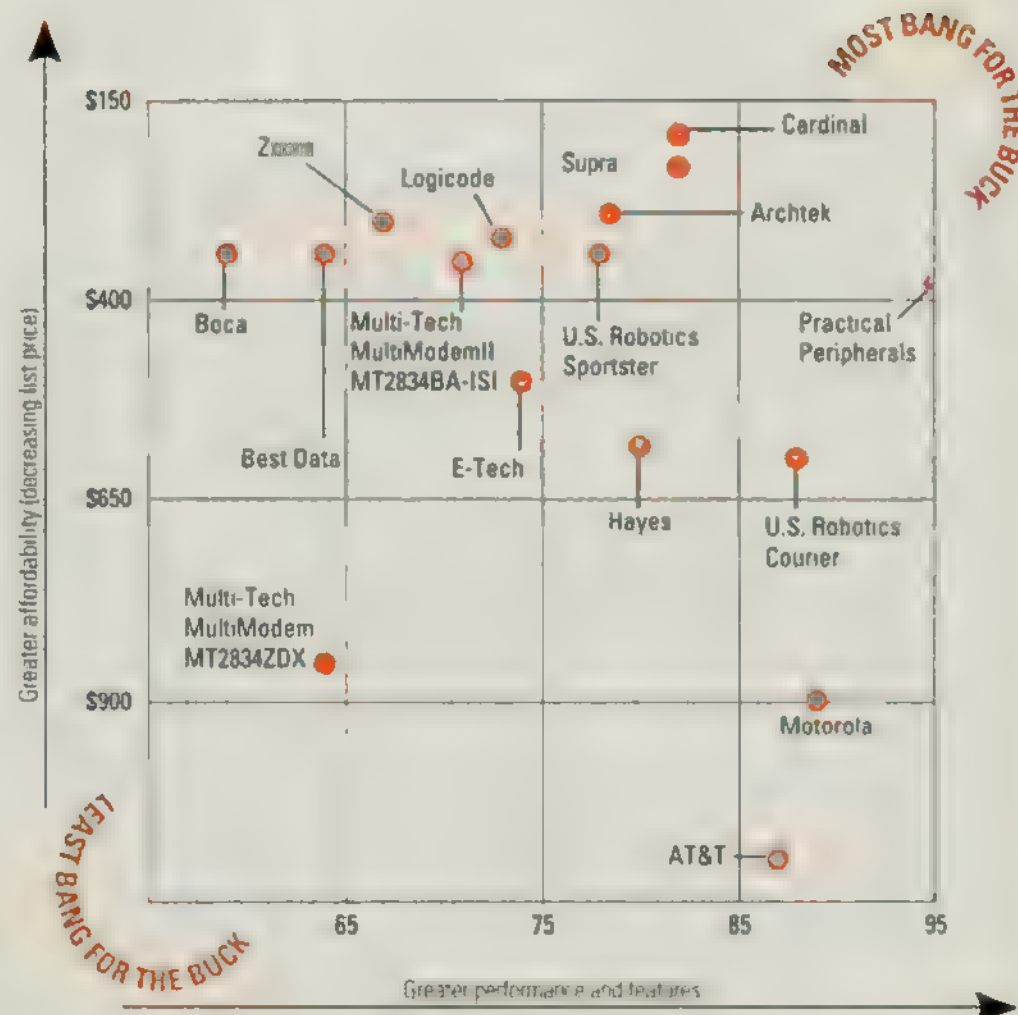
CIRCLE 321 ON READER SERVICE CARD

■ Price/Performance Index: V.34 Modems

This set of V.34 modems turned out to have a wide range of performance and an even wider range of prices. Expect prices to fall and performance to improve over the next six months.

We found that a modem's price does not necessarily correlate with its performance. The best-performing modem, the Practical Peripherals ProClass 288MT V.34, was in the middle of the price range, at \$379. One of the highest-priced modems, the Multi-Tech MultiModem MT2834ZDX, finished near the bottom on our performance tests. The least expensive modem, the Cardinal 28.8 Fax/Modem, had very respectable performance.

We plotted price only against performance here, so scan our Summary of Features table and the individual reviews to evaluate each modem's features. We evaluated each modem's performance on our four different homogeneous tests: the Telephone Network Simulation, Throughput vs. File Type, Call Connect Reliability, and Block Acknowledge Delay tests. We weighed the Telephone Network Simulation test more heavily than the others because it exemplifies a modem's ability to handle realistic line conditions. Interoperability performance was not evaluated here.



most models in this price range are much smaller. In our testing, the Smart One's network model coverage was good but its call-connect reliability was only 65 percent, which was among the lowest in this group of V.34 modems. Its unidirectional file transfers were satisfactory, but its bidirectional transfers were weak (although this was true of most of the Rockwell-based modems).

Not surprisingly, the Smart One does not offer flash ROM, and asymmetric bit handling is not supported. It has eight LEDs, but none of the lights indicate speed.

The Smart One 2834FX uses the standard Rockwell chip set, data pump, and controller. Of course, all the lower speeds are supported, including the international standards for low speed, V.21 and V.23. All the normal fax modulations through 14.4 Kbps are provided. Fax Classes 1 and 2 is provided as well.

The Best Data manual includes an explanation of the modem's commands, but it has no index, and the ITU modulations technical table is incomplete. Based on its poor call-connect reliability and the fact that little was outstanding in this modem, it's hard to recommend the Smart One

2834FX against others here, even at a very interesting price.

► **Smart One 2834FX.** List price: \$339. Best Data Products Inc., 21800 Nordhoff St., Chatsworth, CA 91311; 800-632-2378, 818-773-9600; fax, 818-773-9619; no e-mail.

Circle 427 on reader service card

Boca Research Inc.

● V.34 28,800bps External BocaModem

Here's a medium-priced, sleek-looking modem that is one of the few in our roundup to include both a serial cable and a serial port card. But frankly, considering the good performance the Boca V.FC model turned in last year, we find the V.34 28,800bps BocaModem to be a disappointment.

The V.34 BocaModem's throughput for file transfers was poor; for bidirectional transfers in particular, the V.34 BocaModem was among the poorest performers of those tested. The call-connect reliability test, however, showed the V.34 BocaModem to be in the middle of the group.

FaxWorks 3.0 and COMit-LITE are included with the V.34 BocaModem, as is a diagnostic program for your serial port. Technical support is provided by phone, on-line over CompuServe, and via Boca's own BBS. You receive a reasonably good manual with the V.34 BocaModem, complete with a glossary of telecommunication terms.

Don't expect much assistance from the LEDs on the V.34 BocaModem, however. There's no way of knowing whether you're actually connecting under V.34 or V.FC. Furthermore, you won't be able to tell the speed at which the connection is made.

We would like to be more positive about the V.34 BocaModem; performance considerations, however, prevent us from recommending this modem. Given Boca Research's experience and its commitment to communications, we are sure that improvements will be made—probably by the time you read this.

► **Boca V.34 28,800bps External BocaModem.** List price: \$339. Boca Research Inc., 6413 Congress Ave., Boca Raton, FL 33487-2841, 407-997-6227; fax, 407-997-0918; no e-mail.

Circle 428 on reader service card



Serial Port Modem with Windows

WHAT HAPPENS TO WINDOWS DATA WITH AN ORDINARY MODEM.

NOW WITH
V.34!

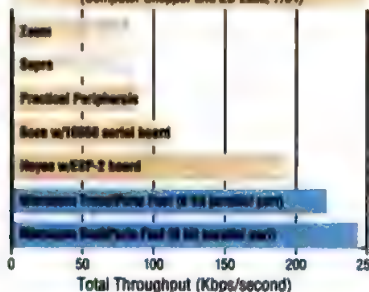


Parallel Port Modem with Windows

WHAT HAPPENS TO WINDOWS DATA WITH A MICROCOM MODEM.

Modem Performance in Windows

(Computer Shopper and ZD Labs, 7/94)



The problem with ordinary modems is the serial port bottleneck. At high speeds, Windows data slams on the brakes as it tries to squeeze through your modem's **serial port—which can only transfer data one bit at a time**. Results: slower performance, frequent loss of data and higher phone charges.

A serial port accelerator card can help, but it can add \$100 to the price and is difficult to install.

So Microcom got the bright idea of using the **parallel port—which transfers data 8 bits at a time**. And pioneered parallel port technology with a whole family of competitively-

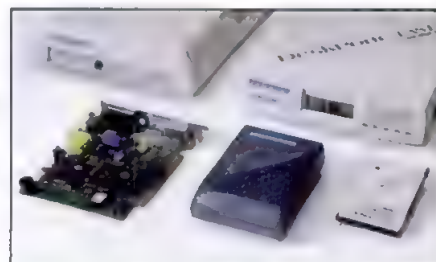
priced modems, including a high-speed PCMCIA card for notebook users.

As the ZD Labs chart clearly shows, this solution is a winner. In fact, the DeskPorte FAST 28.8 was "Experts' Pick" in the July '94 issue of *Windows Sources*. Both Microcom modems they tested achieved "...the highest overall throughput of any rival."

Like all our modems, they also include a standard serial port for **DOS, OS/2 and UNIX** as well as Windows communication.

For the Microcom reseller nearest you and a copy of the White Paper, *Parallel Port Interface: A Windows® Communications Necessity*, call Microcom at

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CIRCLE 882 ON READER SERVICE CARD

■ The Best Bells and Whistles

It's the "bells and whistles," the details of the human interface, that make arcane technical devices like modems usable and even fun. Modem designers focus on peak performance and in some cases cost, but no product in our review set has optimized the human element. Throughput has multiplied by 100 in the last ten years, but in many cases the modem's human interface is the same as it was ten years ago—a few buttons and lights.

Here's our list of the best modem bells and whistles:

- **External volume control.** The ability to tone down modem squeals is a key feature in a crowded office.
- **Flash ROM.** When vendors offer firmware upgrades for V.34 modems, flash ROM makes updating easier.
- **LCD screens.** LEDs are fine, but an LCD panel will display a whole range

of diagnostic information. Some let you password-protect your modem.

- **Informative manuals.** Comprehensive manuals provide background and reference information.
- **Quick-reference card.** In addition to a complete manual, a quick-reference card is a useful touch.
- **Serial cable included.** Most modems include a phone cable, but not a serial cable.
- **Voice-to-data switch.** If you use one line for voice and data, you'll want an easy way to toggle between modes.

No modem in our review meets our ideal for a set of bells and whistles, but the Motorola V.3400 and the U.S. Robotics Courier V. Everything come close. In short, we want devices that are powerful yet easy and ready to use. Even the best technology benefits from the right packaging.

Cardinal Technologies Inc.

• Cardinal 28.8 Fax/Modem

Cardinal Technologies, long an active player in the low-cost modem market, offers the V.34 model, and at the lowest list price in this roundup—only \$189. But except for a top showing among other Rockwell-based modems in the call-connect reliability test, the Cardinal 28.8 Fax/Modem's performance placed it in the middle of the lower-priced modem pack. In addition, this modem marks Cardinal's move from using AT&T chip sets to Rockwell chips. So look elsewhere if you need V.32terbo support, though the Cardinal does support flash ROM upgrade.

This small modem has the usual LEDs—you can't see what speed you're running, but result codes show the connect speed. As with others that use the Rockwell chip set, all the usual lower speeds and V.FC are supported. Fax is supported up to 14.4 Kbps and includes V.17 and V.29.

If we were to award a prize to the shortest manual, the Cardinal 28.8 Fax/Modem's would be the clear winner. There's no index, just a table of contents

and a brief explanation of commands. Cardinal provides support via phone, BBS, and America Online. The Cardinal 28.8 Fax/Modem also includes a lifetime warranty.

The Cardinal 28.8 Fax/Modem is one of several low-priced modems with little to recommend it over other, more full-featured modems except a very good price.

► **Cardinal 28.8 Fax/Modem.** List price: \$189. Cardinal Technologies Inc., 1827 Freedom Rd., Lancaster, PA 17601; 717-293-3049; fax, 717-293-3055; e-mail, cardtec@aol.com.

Circle 429 on reader service card

E-Tech Research Inc.

• Bullet 100E

This unusual modem—which looks like a large, black clamshell with a sizable LCD screen—delivered some unique results. The Bullet 100E was one of only three modems that scored 100 percent on the call-connect reliability test, and was among the best in some bidirectional file transfers. But it was one of the poorest performers in network model coverage. Still, its block acknowledge

delay score, in buffered mode, was among the top.

In its favor, though, the Bullet's LCD offers some definitely attractive capabilities that few modems here offer. It can be customized for certain settings, and it provides all sorts of information about the configuration of the modem and displays the speed at which you are connected. This should be a given with all modems.

The Bullet uses the AT&T V.34 data pump and a Motorola controller chip. So it supports V.32terbo as well as the other lower speeds but, of course, no V.FC. Fax support is limited to Class 2.0, but allows all speeds up to 14.4 Kbps. Unfortunately, few fax programs support Class 2.0 today. Product support is available through E-Tech's BBS and a toll-free call to the company.

The Bullet is an interesting modem: The LCD provides useful information that most modems do not, and its file-transfer capabilities and call-connect reliability performance are especially noteworthy. But some of its other performance scores make it tough to recommend outright at this point.

► **Bullet 100E.** List price: \$499. E-Tech Research Inc., 1800 Wyatt Dr., #2, Santa Clara, CA 95054; 800-328-5538, 408-988-8108; fax, 408-988-8109; e-mail, 74774.301@compuserve.com.

Circle 430 on reader service card

Hayes Microcomputer Products Inc.

• Hayes Optima 288 V.34/V.FC + FAX

The first Hayes V.34 offering is a solid contender, with strong throughput performance. The Hayes Optima V.34 is housed in the familiar brushed aluminum case with LEDs in the front. It has no volume control except in the software (the early Hayes modems had external volume controls, but they were dropped years ago). In the Hayes tradition, the file-throughput performance was excellent, especially in bidirectional transmissions, in which the Optima finished at or near the top. Its network model coverage was good, too. We were, however, surprised at the Optima's mediocre performance on the call-connect reliability test.

The Optima implements the V.34 op-

It hit *us* over lunch.

If *we* could order



the combo,

maybe

we could

offer one.

Will that *be* regular?

Slimline Venturis 466

- Slimline easy-access enclosure
- 486DX2 66MHz
- 4MB RAM (exp. to 68MB)
- 270MB hard drive (enhanced IDE on local bus)
- 14" SVGA color monitor
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- 3 ISA expansion slots (2 full-size, 1 half-size)
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- 2 buffered (16550) serial ports
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- Pre-installed MS-DOS® 6.22 & Windows™ for Workgroups 3.11

DECwriter 110i

- 3ppm output
- Money-saving ink cartridge
- Ink supply indicator light
- 5 resident fonts
- Color upgrade option available
- 2-year warranty

Combo Price
\$1,867

Venturis 410i

Same specs as above, with 486SX/33MHz CPU

with printer shown **\$1,665**

Venturis 4100

Same specs as above, with 486DX4/100MHz CPU

with printer shown **\$2,385**

DECwriter™ 110i
\$319
if purchased separately

(Shown w/optional
color upgrade)



Venturis™ 466
\$1,598
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INTRODUCING DIGITAL PC-PRINTER COMBOS.

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Model	Processor	Price
433sx	486SX/33MHz	\$1,079
466	486DX2/66MHz	\$1,299
4100	486DX4/100MHz	\$1,799

Celebris Slimline

560	Pentium/60MHz	\$2,199
590	Pentium/90MHz	\$2,499

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Venturis	4MB	\$200
	16MB	\$700
Celebris	4MB	\$200
	16MB	\$700

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17" Multi-frequency	\$999
21" Multi-frequency	\$1,999

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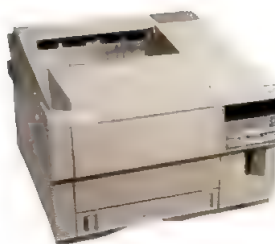
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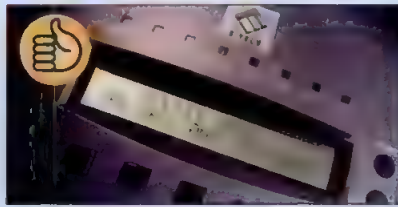


■ All Manner of Modems

By Leslie Wygant



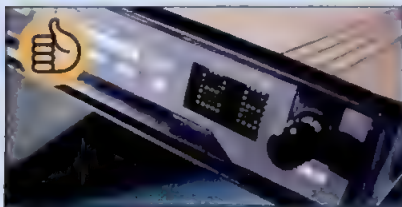
Logicode takes a leap with its icons, like a person running to show a high-speed connection—but they aren't easy to decipher.



E-Tech's Bullet 100E has its LEDs and LCD on top. You can use the LCD for configuring the modem.



With the AT&T Comsphere 3810Plus, you can configure the modem and perform self-diagnostics.



Easy to spot on the front of the modem, the SupraFAXModem's 2-digit alphanumeric LCD shows the modem's connect speed.



E-Tech's Bullet 100E's volume control is ideal: It's a slide control on the side of the modem, labeled for volume level.



The U.S. Robotics Courier has an easy-to-use slide volume control with its label and a summary of commands on the bottom.

tion for asymmetrical symbol rates and carrier frequency, as well as four-dimensional trellis coding. But it does not support flash ROM. Also, the manual is complete, but on-line help isn't great.

Hayes claims the Optima will handle a port speed as high as 230.4 Kbps, but the RS-232 specification only provides for signaling up to 115.2 Kbps. For a higher speed you'll need a coprocessor-equipped board like the Hayes ESP 2.0 (\$99).

The Optima impressed us with its performance except for its call-connect reliability and its lack of flash ROM. With its sturdy construction and impressive throughput, the Optima is a good choice for a medium-priced modem.

► **Hayes Optima 288 V.34/V.FC + FAX.** List price: \$579. Hayes Microcomputer Products Inc., P.O. Box 105203, Atlanta, GA 30348; 404-441-1617; fax, 404-449-0087; e-mail, tech_support@hayes.com. Circle 431 on reader service card

Logicode Technology Inc.

• Quicktel 2814XV

Looking for a reasonably-priced modem that offers flash ROM and V.25bis dialing commands in addition to the standard AT

command set? Logicode's Quicktel 2814XV, at \$279.99 list, may be for you, though its test performance was mediocre.

Logicode's modem supports flash ROM, which is the only practical method for getting code upgrades from the manufacturer. With the Quicktel you can also impose a maximum speed, which ensures a more stable connection. Remote configuration is optional.

It would be an easy winner if we were to offer a prize for most outrageous design: It is wedge-shaped with a big black "eye" and another small one on one side. Various symbols light up on these surfaces to indicate what is happening. They are not labeled, though, so you need to learn what they mean before they are even as informative as the typical LEDs.

Overall, the Quicktel performed reliably for file transfers, and better in unidirectional than bidirectional testing. Its call-connect reliability results were disappointing. Based on the Rockwell chip sets, the Quicktel handles Class 1 and 2 fax, and Logicode promises support for Class 2.0 in the future.

The Quicktel comes with two well-written manuals and a quick-reference

card. Logicode offers upgrades for flash ROM through its BBS. Technical support is also provided. Upgrading of the code should improve performance in the areas we found wanting.

► **Quicktel 2814XV.** List price: \$279.99. Logicode Technology Inc., 1380 Flynn Rd., Camarillo, CA 93012; 800-735-6442, 805-388-9000; fax, 805-388-8991; e-mail, logicode@aol.com.

Circle 432 on reader service card

Motorola Information Systems Group

• Motorola V.3400

Big is the word for the Motorola V.3400. It is big on power, big on features, and big on your desktop. It includes a useful (not to mention big) LCD. Furthermore, it was a pretty big hit on our tests. The V.3400 turned in a good show in our bidirectional and call-connect reliability tests. It has a lot to offer and may even be too much for the average user. But if you're shopping for a high-end modem full of features, you won't mind the V.3400's rather big price: \$895 list.

The V.3400 includes nine preset factory configurations, full leased-line support, and several layers of security for remote

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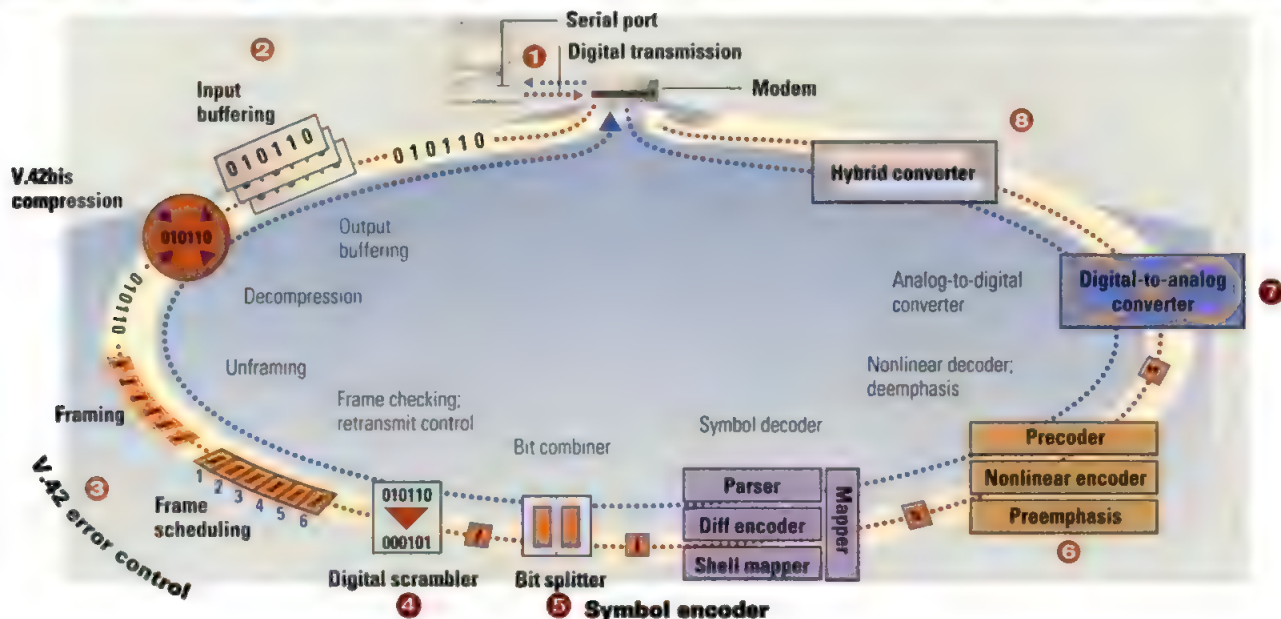
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CIRCLE 304 ON READER SERVICE CARD

INSIDE THE MODEM

① The data transmission in a V.34 modem begins at your computer's serial port. ② The data is transferred to the modem and compressed. ③ The compressed data is then grouped into blocks, or frames. ④ The digital scrambler takes the information, or I frames, and breaks up any problematic bit patterns that would interfere with the ability of the V.34 modem's signal converter to maintain synchronization with the modem on the other end. ⑤ The symbol encoder takes bits from the I frames

and converts them into digitally encoded analog signals, or symbols. ⑥ The precoder and nonlinear encoder modify each symbol to be transmitted over the telephone line. ⑦ Next, the digital-to-analog converter converts the symbols into analog signals. ⑧ The hybrid converter couples the output onto the subscriber circuit to the telephone central office. That completes the transmission process.

Received data travels through the modem in the opposite direction.



access. You can control the symbol rate (baud) and speed from the LCD on the front panel. The front panel configuration can be password-protected, too. Its thorough manual, which includes a glossary and index, details the many commands you can use to customize calls.

The Motorola V.3400 showed especially well in bidirectional file transfers. We assessed its call-connect reliability at 100 percent, a level achieved by only two other modems tested. Surprisingly, though, the V.3400 did not do as well on the block acknowledge delay test, with either character or block transmissions.

If you need a solid modem that performs well and has extensive features, such as secure remote access and secure callback, look to the V.3400, pricey though it is.

► **Motorola V.3400.** List price: \$895. Motorola Information Systems Group, 20 Cabot Blvd., Mansfield, MA 02048-1193; 800-487-1456, 508-261-4000; fax, 508-337-8004; no e-mail.

Circle 433 on reader service card

Multi-Tech Systems Inc.

• Multi-Tech MultiModem MT2834ZDX • Multi-Tech MultiModemII MT2834BA-ISI

Multi-Tech Systems, long known for quality (more among corporate clients than at the retail end), fielded two modems here. The MultiModemII MT2834BA-ISI is a higher-end model with good features, but its performance needs some improvement to compete with other modems in its price range. The MT2834ZDX is more barebones and low-priced but packs a lot of punch.

The MT2834BA-ISI has flash ROM and 13 LEDs, one of which tells your connection speed. It also has volume control. The MT2834BA-ISI offers callback with password protection; synchronous modem and V.25bis commands are supported, too. The MT2834ZDX shows the

connection speed, but it doesn't support flash ROM and has no volume control.

The MT2834ZDX manual is a small, stapled booklet with a very limited description of commands. The MT2834BA-ISI manual is complete and includes a quick reference card.

Our lab tests showed the MT2834-ZDX to be a respectable performer. Its call-connect reliability was above average, and its unidirectional file-transfer performance was average. The MT2834BA-ISI was good in unidirectional transfers and unexceptional in bidirectional transfers, and it had a respectable score for network coverage. Its call-connect reliability score was, at 92 percent, disappointing for its class.

Support is offered by Multi-Tech's BBS, from an 800 number and on CompuServe.

The MT2834ZDX seems a good choice if you want a small, portable modem with decent performance. But we were disappointed by the MT2834BA-ISI; other modems perform better in its price range. Perhaps new code next year, easily installed with flash ROM, will change this.



"If you want your modem to look great while you're cruising through cyberspace at 28.8 Kbps, consider the Logicode Quicktel 2814XV."



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CIRCLE 241 END USERS ON READER SERVICE CARD
CIRCLE 323 RESELLERS ON READER SERVICE CARD



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■ More Where They Come From

We caught most of the early implementers of the V.34 standard in our roundup, but several other modems came on the market after our testing was completed. Here's a list of vendors that plan to have V.34 modems available by the time you read this:

Adtech Micro Systems Inc., Smart-Connect 288, \$299; 510-659-0756.

Computer Peripherals Inc., ViVa 28.8 V.34ext, \$335; 800-234-7811.

General DataComm Inc., FastPro, \$675; 800-523-1737.

MaxTech Corp., MaxTech 28.8 V.34, \$199; 800-936-7629.

Megahertz Corp., Megahertz 28.8 PCMCIA Fax Modem, \$499; 800-527-8677.

Microcom Inc., DeskPorte FAST, \$519; 800-822-8224.

Penril Datability Networks, Alliance V.34, \$995; 800-473-6745.

Racal-Datcom Inc., ALM 3239, \$949; 800-722-2555.

Smart Modular Technologies Inc., ST2814, \$449; 800-536-1231.

TDK Systems, TDK DF2814 V.34 Data/Fax Modem Card, \$499; 916-478-8421.

Telebit Corp., FastBlazer 8840 Standalone, \$1,199; 508-441-2181.

Western DataCom Co. Inc., CryptoCom V.32bis/V.34, \$995; 800-262-3311.

Zoltrix Inc., Zoltrix V.34 288SE, \$179.95; 510-657-1188.

ZyXEL, ZyXEL Elite 2864, price unavailable; 800-255-4101.

Zypcom Inc., Z34-SX, \$749; 510-783-2501.

► **Multi-Tech MultiModem MT2834ZDX**. List price: \$349. **Multi-Tech MultiModem-II MT2834BA-ISL**. List price: \$849. Multi-Tech Systems Inc., 2205 Woodale Dr., Mounds View, MN 55112-9907; 800-328-9717, 612-785-3500; fax, 612-785-9874; no e-mail.

Circle 434 on reader service card

Practical Peripherals

• ProClass 288MT V.34

Practical Peripherals' ProClass 288MT V.34, at \$379 list, is a top performer. Housed in an interesting minitower, the PC288MT V.34 was excellent both in our file-transfer tests and in the telephone network simulation test. The PC288MT V.34 was disappointing only on the call-connect reliability test.

The 288MT V.34's LED lights don't provide much information, but in its AT16 command, Practical Peripherals reveals the link's statistics, including such details as whether you have a V.34 or a V.FC connection. The connect speed can and often does drop after a short period of time, and the 288MT V.34 will tell you the true speed.

The 288MT V.34's lifetime warranty is one of the most generous we've seen. Technical service is assured by Practical Peripherals' own BBS, through the Inter-

net, on CompuServe, and by phone.

It's too bad the 288MT V.34 doesn't support flash ROM—you'd pay for chip replacement in case of an upgrade. We'd also like to see support for asymmetrical channels, to help optimize connections. The manual is spare but covers the essentials.

The 288MT V.34 is by far a top performer overall, as noted in the Price/Performance Index, and impressed us by working seamlessly during testing. Its support for synchronous capabilities is a plus, as is its ability to check speed. It is a good choice for many users.

► **ProClass 288MT V.34**. List price: \$379. Practical Peripherals, 375 Conejo Ridge Ave., Thousand Oaks, CA 91361-4928; 800-442-4774, 805-497-4774; fax, 805-374-7200; no e-mail.

Circle 435 on reader service card

Supra Corp.

• SupraFAXModem 288

With an already solid reputation for producing low-priced modems, Supra adds another to its line: The SupraFAXModem 288, at \$229.95 list, builds in more than just V.34 compliance to the V.FC version. The SupraFAXModem 288 also supports flash ROM and another innovation we appreciated, an LED that displays connection



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NETWORKING
V.34 Modems

speed in addition to the usual LEDs for transmitting and receiving data. Few modems in this price range deliver this kind of detail. You'll also be surprised to find a serial cable in the package and even an adapter, in case your system has a DB-25 connector instead of the usual DB-9.

In addition to being a top performer, U.S. Robotics' Courier V.Everything offers flash ROM and useful LED and speed indicators.

It's too bad the SupraFAXModem 288 was only an average performer throughout our tests—although it was at the higher end for call-connect reliability among Rockwell-based modems. Its manual is adequate, with commands briefly explained. Supra provides technical support through its BBS, on CompuServe, and via the Internet, as well as direct calls to the company.

Though offering no special performance advantages, the SupraFAXModem 288 does stand out for a few touches not found in other low-cost modems, such as speed reporting on the front panel and flash ROM. Code upgrades are likely to be necessary as V.34 evolves and improvements are made, so flash ROM is a valuable feature, and the SupraFAXModem is worth consideration for this feature alone.

► **SupraFAXModem 288.** List price: \$229.95. Supra Corp., 312 SE Stone Mill Dr., #150, Vancouver, WA 98684; 800-727-8772, 206-905-1400; fax, 206-905-1401; e-mail, sales@supra.com.

Circle 436 on reader service card

U.S. Robotics Inc.

EDITORS' CHOICE
Courier V.Everything
● **Sportster 28,800**
Data/Fax

With an abundance of features, performance results among the best in this roundup, and a list price that's not bad for

all you get, the Courier V.Everything is very complete. If it's still a bit too rich for your blood at \$595, the smaller Sportster 28,800 Data/Fax has fewer features but is nonetheless worth consideration.

The Courier V.Everything offers flash ROM, asymmetric channels, password-protected callback, and remote configuration. It has a watchdog timer; the only others in our roundup to offer one were the much more expensive AT&T Paradyne and Motorola modems. The Courier modem also has an easy-to-adjust volume control, but the label is on the bottom, as is a summary of commands.

U.S. Robotics' Sportster is much smaller. It has volume control but you must lift it to adjust it. Its manual is smaller, too, and it has no quick-reference card. The Courier V.Everything manual has a complete explanation of commands and a glossary of commonly used telecommunications terms.

The Sportster has many of the Courier V.Everything's features but lacks flash ROM, remote configuration, call-



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NETWORKING
V.34 Modems

back security and synchronous mode, and V.25bis dialing, as well as leased-line support.

In file transfers, the Courier V.Everything finished among the top five modems. And with a score of over 99 percent for call connect reliability, the Courier was again among the top modems. The Sportster's performance was similar, except for lower scores on call-connect reliability and network model coverage.

Technical support is provided via an 800 number, U.S. Robotics' BBS, CompuServe, and the Internet. The Courier comes with a limited 2-year warranty; the Sportster has a 5-year warranty.

We were impressed by the Courier V.Everything's wealth of features and superior test results. Though the Courier is higher-priced than many of the modems we tested, it's a good value. As for the Sportster, though we would have liked flash ROM, it is a good, low-cost way to get to V.34.

► **Courier V.Everything.** List price: \$595. U.S. Robotics Inc., 8100 N. McCormick Blvd., Skokie, IL 60076-2999;

800-877-2677, 708-982-5010; fax, 708-933-5800; e-mail, salesinfo@usr.com. **Sportster 28,800 Data/Fax.** List price: \$339. U.S. Robotics Inc., 7770 N. Frontage Rd., Skokie, IL 60077-2690; 800-342-5877, 708-676-7010; fax, 708-676-7320; e-mail, salesinfo@usr.com.

Circle 437 on reader service card

Zoom Telephonics Inc.

• **Zoom/FaxModem V.34X**

In a world of shrinking modem sizes, Zoom Telephonics has remained faithful to its large slab design with its first V.34 offering, the Zoom/FaxModem V.34X. It also maintains the LEDs, but adds some additional innovations.

The Zoom/FaxModem V.34X includes lights to indicate which modulation is in use: V.34, V.FC, or 14.4 Kbps. The Zoom/FaxModem even has a light to show that it is in fax mode. But it still doesn't tell you the actual speed at which you are connected, or whether the line quality is good. Zoom includes some commands to tell you why—for exam-

ple—there was an inopportune disconnect, but that's about all.

This modem's performance was adequate overall for file transfers—a little better than some but bested by several others. The Zoom/FaxModem performed really poorly—at the bottom of the pack, in fact—on the call-connect reliability test. The call-connect reliability test measures how frequently the user gets a good connection over a wide spectrum of line qualities.

The manual includes a listing of commands and a glossary of terms, as well as ten appendixes. Zoom offers a seven-year warranty.

Zoom's aggressive pricing will be attractive to many people. And for users satisfied with moderate performance, you could do worse than a Zoom/FaxModem V.34X. □

► **Zoom/FaxModem V.34X.** List price: \$299. Zoom Telephonics Inc., 207 South St., Boston, MA 02111; 800-666-6191, 617-423-1072; fax, 617-423-9231; no e-mail.

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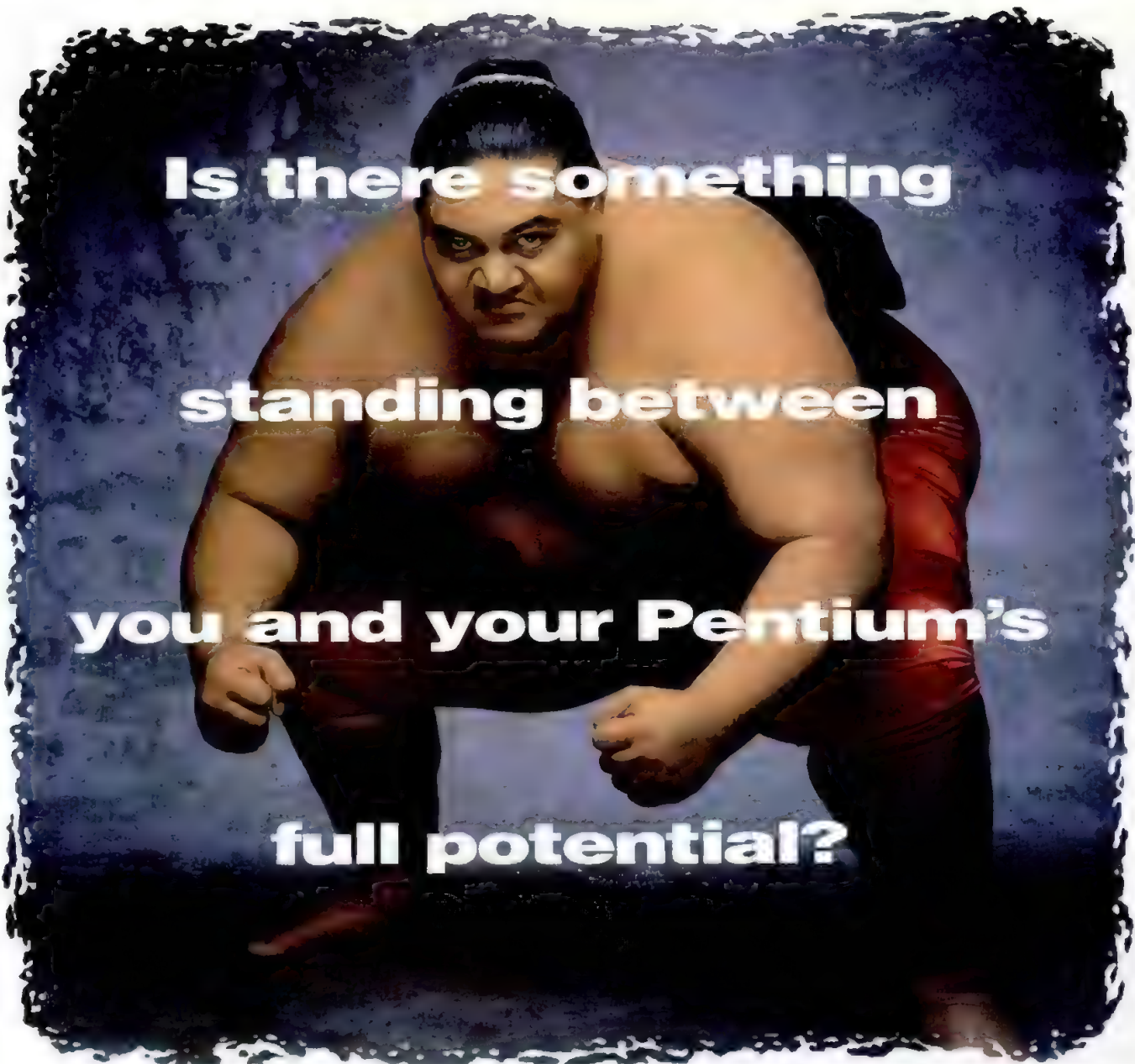
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— PC Magazine, 6/28/94 "The Perfect PC"

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CIRCLE 117 ON READER SERVICE CARD

Network Edition

First Looks

► ISDN MODEMS

ISDN Sleight of Hand

Don't give up the convenience of analog modems for the speed of ISDN. Get both with the three products tested here.

By John Garriss

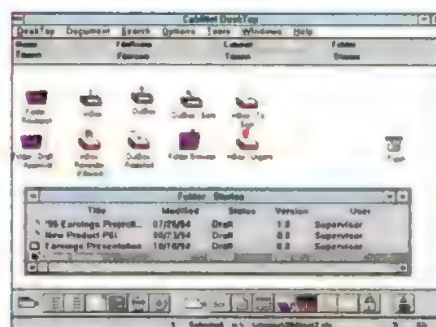
As you ponder the jump to ISDN (Integrated Services Digital Network), consider this: You'll need that old analog phone line and modem to call most sites, unless of course you run one of these three products. The Hayes ISDN System Adapter, IBM's WaveRunner, and the Motorola Hybrid Modem TA 200 are the first ISDN modems to let a PC communicate with analog devices (such as analog modems and fax machines) and ISDN devices over a single ISDN line. The Motorola TA 200 and WaveRunner

Best of all, these products work the way a standard modem does. Like a modem each connects a PC to an external line via a serial port. (The WaveRunner uses its own serial interface.) Naturally here the phone line is digital, not analog. And like modems, these products can use standard communications software. Hence while some may call these products ISDN terminal adapters, we call them ISDN modems.

In our past review we looked at ISDN bridges, which connect LANs to ISDN lines. They are engineered for dedicated, high-performance ISDN operation (See "Betting on the Dream," October 25, 1994). In contrast, the products in this



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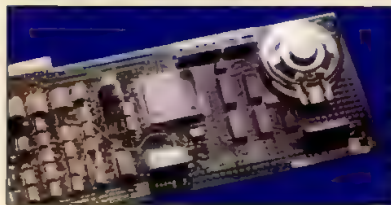


Document management made easy, page NE15

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First Looks

Hayes ISDN System Adapter NE6



► IBM WaveRunner NE10

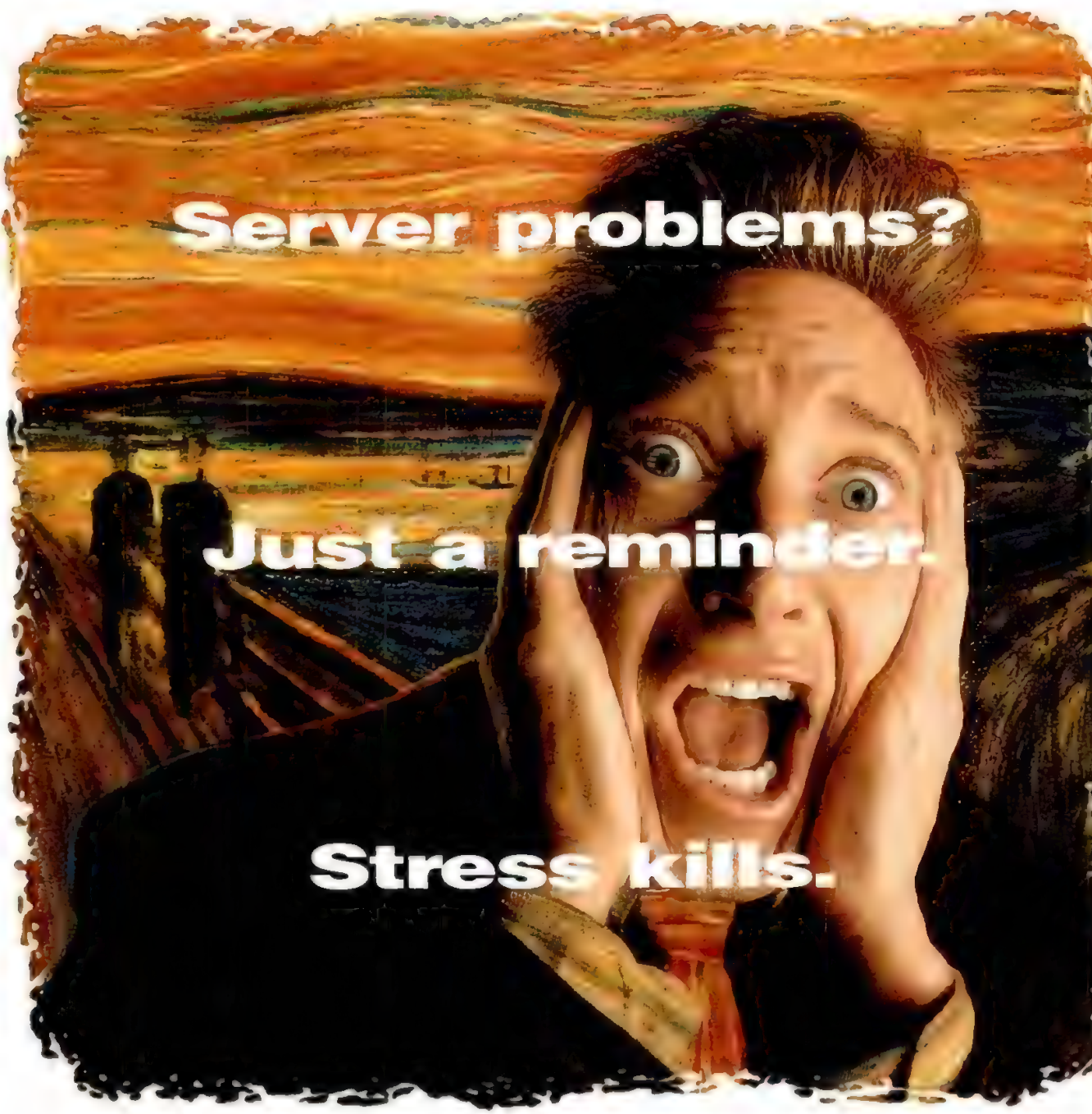


► Motorola Hybrid Modem TA 200... NE12
CabiNet for Windows 1.5b NE15
Digital StorageWorks
RAID Array 210 NE16
XNet Series 1800 ParallelSwitch NE18
Symplex Direct Route series NE22

The Networker

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NE27



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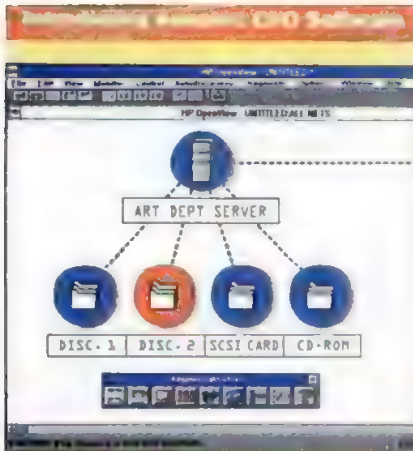
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*Benchmark performed on a Dell XPS-90, using ST 12560W drives and Netframe DX 2.02

LAN using ISDN or call an on-line service or send a fax to an analog fax machine over that same ISDN line. What does one of these products cost? Less than \$1,000. And while they may not be quite the perfect ISDN solution, these products are quite useful.

KEEP IT SIMPLE

The concept behind an ISDN modem is simple: To all of your applications, this ISDN device is just like a modem. It runs the same software as an analog modem. It connects to the PC through a serial interface as an analog modem does, and applications talk with your ISDN device as they do with an analog modem by sending data directly through a selected COM port. They can even send standard Hayes AT commands to configure the device and make analog or digital phone connections. In fact, the only real difference you'll see is faster transmission speeds; when connecting over ISDN, one of these products can use one 64-Kbps ISDN B channel to talk with remote devices.

These products are also unique in that they can automatically sense the kind of incoming call—whether analog or digital—and handle the call appropriately. During call setup between the sending and receiving devices, one of two kinds of connections is made: a circuit switched data (CSD) connection, which indicates a

• WaveRunner

The WaveRunner, from IBM Corp., is a slick product. Just stick it inside your PC, run the configuration utility, and suddenly you can communicate with all sorts of places using lots of different protocols. On

the ISDN side, you can use the V.120 protocol to talk with other ISDN terminal adapters, or you can use an async-to-sync driver to connect remotely to your LAN or to hook up to the Internet via SLIP. On the analog side, you can talk to regular V.32bis modems, or you can use the included fax software to send and receive faxes. And you never have to unplug any wires behind your

computer, change your COM port settings, or use any communications software other than the stuff you already own. There are limitations to the product: It lacks two-B-channel operation for 128 Kbps and has no ISDN compression capabilities. But overall, we find that the WaveRunner, our Editors' Choice, provides the best value of the products here.



call between two ISDN devices or a circuit switched voice (CSV) connection, which indicates a call between an ISDN and an analog device.

These units vary, however, in how they handle these calls. Two of them, the Motorola TA 200 and the WaveRunner, include support for a number of analog protocols (such as V.32bis, V.42bis, and Group III fax) directly on the device, so they can talk directly to analog modems and fax machines without additional hardware. The Hayes Adapter, on the

other hand, does not directly support any modem protocols. Instead, it has a port to connect with an analog modem. Aside from the extra hardware and cabling then, you also need an extra serial port for the Hayes Adapter to receive ISDN and analog calls simultaneously; that's one too many ports for most people.

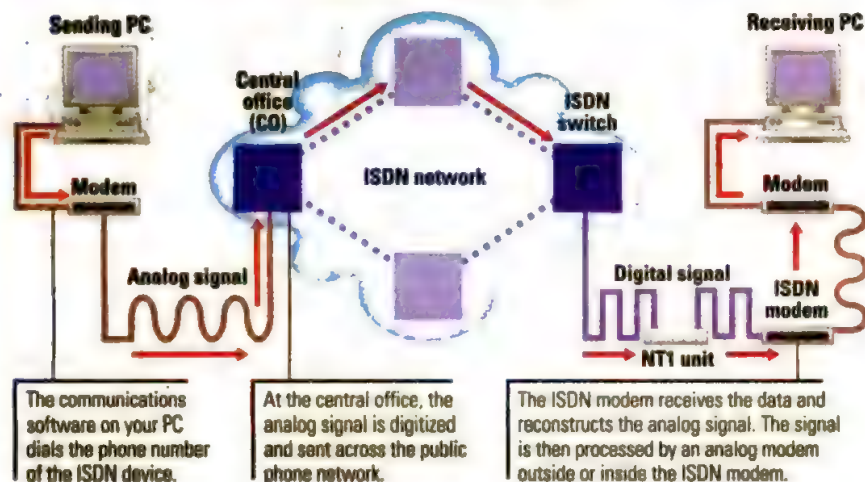
THE (NOT QUITE) BEST OF BOTH WORLDS

Unfortunately, if you're looking for blazing speed across your ISDN connections you may find that other ISDN connections offer better performance (see "The ISDN Market: What to Buy"). Although a typical ISDN basic rate interface (BRI) connection consists of two 64-Kbps B channels for data and one 16-Kbps D channel for data or call-setup information, these products will only let you use one B channel at a time for your ISDN calls. Other ISDN products, such as DigiBoard's PC IMAC ISDN adapter, use a technique called *BONDing* (Bandwidth ON Demand) to let you combine both B channels to form a single 128-Kbps channel per connection. Furthermore, during testing our ISDN calls were actually limited to 56 Kbps on the B channel due to restrictions imposed by our regional ISDN carrier.

A couple of other factors hinder performance as well. The first is the lack of compression standards. Since none of

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these products support compression for ISDN calls, you may actually find that some 28.8-Kbps analog modems are faster than these ISDN devices when transferring compressible files such as vector graphics or even plain text. And second, since these products use the serial port to communicate with your PC you may be bottlenecked by the speed of the serial chip, or UART, sitting in your PC. Older UART chips, which are still found on many PCs, can produce errors when transmitting data at speeds higher than 19.2 Kbps, although newer 16550A UARTs can usually handle 57.6-Kbps transmissions safely. The WaveRunner avoids the UART problem by incorporating a high-speed serial chip directly on the card.

TOUGH IT OUT

Don't expect your first attempt to configure these ISDN adapters to be a successful one. ISDN can be confusing for first-time users, and your ISDN access carrier

needs to provide you with a set of configuration parameters, such as Service Provider ID (SPID) numbers and switch types, before you can start using any of these products. Luckily, we found that each of the devices here does a fairly good job of stepping you through the arduous process of getting up and running. The Motorola TA 200 was the best here; it comes with a set of front-panel buttons and an intuitive LCD panel to help you make all your configuration selections.

Another consideration is a box called an NT1 (network terminator). An NT1 terminates the electrical connection between the phone company's central office switch (commonly called a CO) and the customer site. The NT1 (approximately \$200 to \$300), which is required in the United States, is normally separate from the ISDN device. The Motorola TA 200 is the only product here that builds an NT1 directly into the unit.

Once you're up and running, these

products use the V.120 protocol to communicate with other ISDN devices. This protocol encapsulates the asynchronous data coming off of your PC's serial port within a synchronous, clock-driven ISDN signal.

Unfortunately, not all of the ISDN world communicates via V.120. For example, some ISDN Internet service providers use synchronous Point-to-Point Protocol (PPP) to provide access to remote ISDN users. Without a driver specifically to convert asynchronous TCP/IP data to synchronous PPP, these products will not be able to talk to those ISDN devices. In this regard the WaveRunner really shines; it's the only product here that offers both V.120 and synchronous PPP.

SPEED VS. FLEXIBILITY

In the end, the choice is yours. These products are inexpensive, and they give you a lot of connectivity options. But if what you really want is fully powered, high-performance ISDN, then you may find them too sluggish for the task at hand.

THE ISDN MARKET: WHAT TO BUY

As a remote business user, you may want ISDN, but what kind of ISDN do you want? Here is a breakdown of the kinds of products that you can buy to service your ISDN needs.

Product type	ISDN bridges/routers	ISDN modems	ISDN adapters
Description	These external products connect to an Ethernet network, which connects to your PC	Also called ISDN terminal adapters. We are calling these products <i>modems</i> because they behave exactly like analog modems. Like an analog modem, an ISDN modem connects a PC to the phone line via the serial port. (Even the WaveRunner, an internal card, communicates via its own specialized hardware and software, which handle serial communications.) But the ISDN modem sends the PC's signal out through an ISDN connection without converting it from digital to analog	These products connect to your PC internally. They bypass the serial chip on your computer and communicate directly over a PC bus using a protocol such as WinISDN or an ODI-compliant driver
Pros	High performance; can use <i>BONDing</i> to combine both 64-Kbps B channels on one connection	Inexpensive. Can use standard applications, which use a specified COM port to talk to both analog and ISDN devices	Offer faster throughput than ISDN terminal adapters; can combine both B channels for a single 128-Kbps connection. Less expensive than ISDN bridges/routers
Cons	Expensive. Limited interoperability with other ISDN devices. No interoperability with analog devices. Require an Ethernet card in your PC	Low performance—generally limited to a single 64-Kbps channel per connection. May be limited by UART (serial-chip) bottlenecks in some computers. For most applications, they require V.120 to talk to other ISDN devices	No interoperability with analog devices. Can be more expensive than serial-port terminal adapters
Sample products	Ascend Pipeline 50 LS56, Cominet Everywhere, Gandalf LANLine 5240i	The products reviewed in this roundup.	DigiBoard DataFire; Extension LD-LAN, Models E-101 and E-201, ISDN*tek Access Internet Card

Hayes Microcomputer Products Inc.

• Hayes ISDN System Adapter

We found the Hayes ISDN System Adapter fine for single-channel ISDN connections, but its lack of analog protocol support is limiting. And its high price tag of \$999 (without an NT1) makes it by far the most expensive product in this roundup. Like the Motorola Hybrid Modem TA 200, the Hayes Adapter is an external unit that connects to your PC using a standard RS-232 serial cable. For ISDN services, the device supports the V.120 protocol, over a single 64-Kbps uncompressed B channel, for communications between two asynchronous devices (such as PCs).

Unlike the other products here, though, it does not directly support calls to analog modems. Instead, circuit-switched voice (CSV) connections are sent off the ISDN line to an analog port on the device, into which you plug your own analog modem. With this approach, you need either to swap serial-port connections at the back of your PC, or use two serial ports for the two devices, to handle both analog and ISDN calls.

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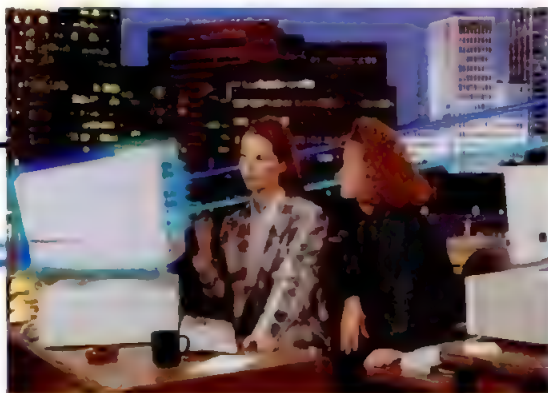
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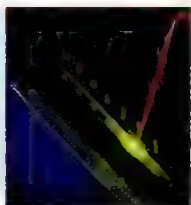
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Hayes ISDN System Adapter



Much like a regular modem, the Hayes ISDN System Adapter has LED lights to indicate line conditions, send and receive modes, and DTR status.

An RJ-11 jack connects to a standard telephone or analog modem.

This RJ-45 jack connects to a separate NT1 unit.

DIP switches let you specify termination, enable or disable AT command-set operation, and specify RS-232 or V.35 mode.

The DB-25 connector connects to a serial port on your PC.



There are advantages to having a separate analog port. We found the port convenient for people who already own 28.8-Kbps modems or who want to use a standard analog telephone over the ISDN line. Since the Hayes Adapter's port looks

just like a regular phone jack, we found it very easy to use.

The Hayes Adapter comes with configuration software, both for DOS and Macintosh systems, which simplifies the configuration process. The comprehen-

sive user's manual, furthermore, was helpful in providing quick information. Unlike the Motorola TA 200, the Hayes unit has no front-panel buttons or LCD indicators, but it does have eight LED indicators to display status information.

You can also configure the Hayes Adapter to support X.25 packet-switched services or to run in synchronous mode at 56 or 64 Kbps. Unfortunately, like the Motorola TA 200, the Hayes Adapter does not support asynchronous-to-synchronous PPP conversion, which limits its connectivity options.

Overall, if you are looking for an ISDN modem, but you don't need analog support on the device, then the Hayes ISDN System Adapter may work well for you. But if you want a single product to support all of your remote connections, you may find a product such as the WaveRunner to be a better value.

► **Hayes ISDN System Adapter.** List price: \$999. Hayes Microcomputer Products Inc., 5835 Peachtree Corners E., Norcross GA 30092-3405; 404-840-9200, 800-429-3739; fax, 404-441-1213.

Circle 952 on reader service card

■ Supercharge Your Internet Access

By Steve Buehler and John Garriss

Internet addicts, are you tired of huge graphics files limping along over slow analog lines? It might be time to surf the Internet over speedier ISDN lines. But look before you leap. You could find yourself with nothing more than headaches and a lot of wasted money.

A number of ISDN service providers are starting to offer ISDN access to the Internet at reasonable rates. Crystal Data Systems (800-840-8638 or <http://www.traveller.com/tis/>) is now providing ISDN Internet access in Alabama to users in its area and is certified to work with the Motorola Hybrid Modem TA 200 and a host of other ISDN products. Here at PC Magazine Labs we worked with Internex Information Services (415-473-3060 or <http://www.internex.com/>) to set up an ISDN Internet connection.

We found the support staff courteous and knowledgeable, and after a few initial failures we were on-line.

We used IBM's WaveRunner and an ISDN*tek Internet Access Card as our ISDN hardware and Internet Chameleon (\$398), from NetManage, for TCP/IP access from our PC. The ISDN*tek adapter is the only product currently available to use the WINISDN API, a specification created by NetManage, PSI, and ISDN*tek. The API is a set of 18 calls that let's applications take advantage of synchronous PPP. ISDN modems that don't use this specification can use only asynchronous PPP.

Though connections were noticeably faster with analog 14.4-Kbps modems, both products used only a single 64-Kbps B channel (which our regional ISDN access carrier further reduced to 56 Kbps). Internex does not

use the V.120 protocol, so we could not use the Motorola TA 200 or the Hayes ISDN System Adapter.

The bottom line is, if you are planning to buy ISDN products for Internet connectivity, your best bet is to call your service provider first. There are a number of interoperability problems when connecting to ISDN services, so don't assume that dialing up over ISDN will be as seamless as making a standard modem connection. The good news is that many service providers, such as Internex, will set you up with everything you need to get up and running.

► **ISDN*tek Internet Access Card.** List price: \$395 (monthly Internet access charges and NT1 (\$200 from PSI) not included); ISDN*tek Inc., P.O. Box 3000, San Gregorio, CA 94074; 415-712-3000, 800-827-7482; fax, 415-712-3003.

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• **WaveRunner**

With direct support for fax and high-speed modems (V.32bis compatibility) as well as drivers for synchronous operation, IBM Corp.'s WaveRunner provides an easy and flexible way for people to connect to their favorite analog or ISDN services today—and tomorrow.

Unlike the other products here, the WaveRunner ships as an internal ISA adapter. This card includes its own DSP chip and software to handle serial PC communications, so you don't have to worry about problems that might occur from using an older 16540 UART in your PC. Unlike the Motorola Hybrid Modem TA 200, the WaveRunner requires a separate NT1, at about \$300, in order to connect to your ISDN line.

We found it fairly easy to configure the WaveRunner for both analog and digital operation. IBM provides a configuration program that clearly led us through all the

required steps. We tested the Microsoft Windows version, although an OS/2 version is also available.

You need to load a software driver and the ISDN Port Manager, a Windows util-

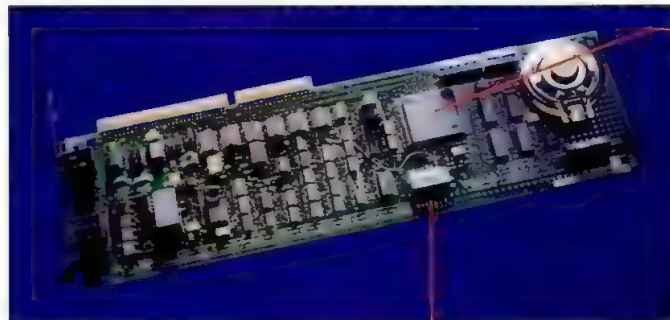
ity, before making any calls with the WaveRunner. With the Motorola TA 200 and Hayes ISDN System Adapter, you simply load your communications package and send data through the serial port—it's that simple.

We were able to place calls to a second WaveRunner without any problems. Our connections to analog modems, however, did not use the V.42bis compression scheme; the WaveRunner supports only the less efficient MNP 5 compression protocol.

In addition to V.120, you can use other drivers to let you connect to other ISDN devices such as bridges and routers. The WaveRunner is the only product here that includes software drivers for HDLC synchronous framing, asynchronous SLIP-to-synchronous TCP/IP conversion, and SLIP-to-synchronous PPP conversion to let you communicate with other devices supporting a synchronous interface. These drivers make the WaveRunner interoperable with more ISDN services; we were able to connect to an Internet service provider using synchronous PPP (see "Supercharge Your Internet Access"). In our minds that greatly increases its value. Like the other products here, however, the WaveRunner is limited to a single data B channel per ISDN connection.

The WaveRunner also includes Data-

IBM WaveRunner



The on-board DSP chip handles the communications from your PC to the ISDN line.

These jumpers let you configure settings such as COM port designations, I/O port addresses, and DMA channels.

The ISDN port connector connects to a separate NT1 unit.

The analog jack does not currently work with analog headsets or handsets.



► SUMMARY OF FEATURES

ISDN Terminal Adapters

Products listed in alphabetical order

■ = YES □ = NO

General Features

Network terminator (NT1) included

Integrated analog modem

Analog phone jack included

Location

Operating systems supported

Setup Methods

Front panel buttons

Configuration program

AT commands

Switch Support

AT&T SESS ISDN

Northern Telecom DMS-100

National ISDN-1-compatible switches

Protocol Support

Integrated V.32bis

Analog data compression

V.120

Synchronous PPP

X.25

Basic Operation

Differentiates between analog and digital calls automatically

Fax software included

Communicates using COM port

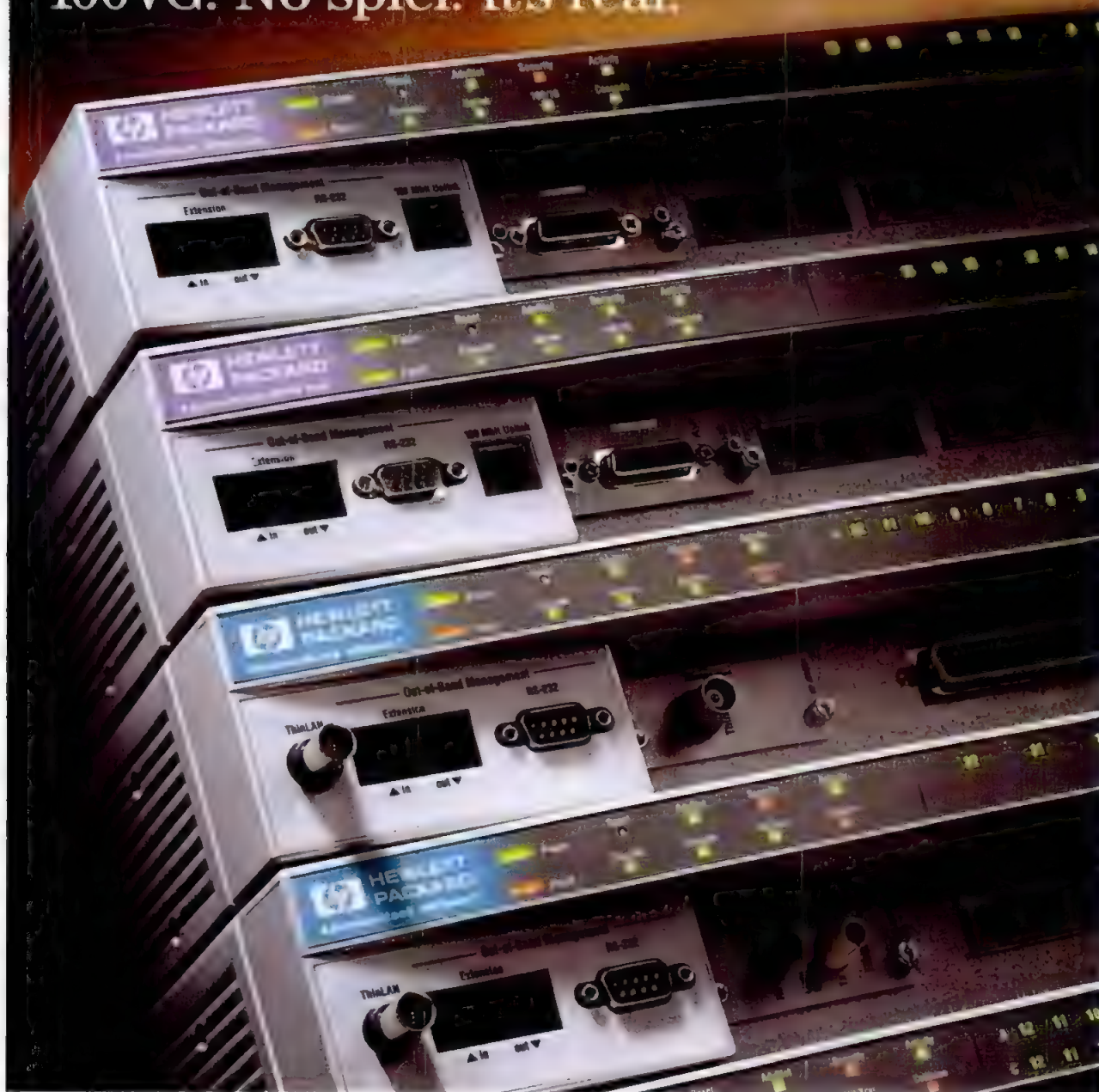
Supports AT command set

Can utilize both B channels on one connection

N/A—Not applicable: The Hayes product does not have an integrated analog modem.

	Hayes ISDN System Adapter	IBM WaveRunner	Motorola Hybrid Modem TA 200
Network terminator (NT1) included	□	□	■
Integrated analog modem	□	■	■
Analog phone jack included	■	□	□
Location	External	Internal	External
Operating systems supported	DOS, Windows, OS/2, Macintosh	Windows, OS/2	DOS, Windows
Front panel buttons	□	□	■
Configuration program	■	■	■
AT commands	■	□	■
AT&T SESS ISDN	■	■	■
Northern Telecom DMS-100	■	■	■
National ISDN-1-compatible switches	■	■	■
Integrated V.32bis	N/A	■	■
Analog data compression	N/A	MNP 5	V.42bis
V.120	■	■	■
Synchronous PPP	□	■	□
X.25	■	□	□
Differentiates between analog and digital calls automatically	■	■	■
Fax software included	None	DataFAX Lite	FaxTalkPlus
Communicates using COM port	■	■	■
Supports AT command set	■	■	■
Can utilize both B channels on one connection	□	□	□

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FAX Lite, from Trio Information Systems, which we found suitable for basic fax sending and receiving, but we thought FaxTalkPlus, which is bundled with the Motorola TA 200, was a little easier to use. Overall, we found the Motorola TA 200 a bit easier to use than the WaveRunner, but we found that the connectivity options available with the WaveRunner make it an excellent value.

► **WaveRunner.** List price: \$545. IBM Corp., 3039 Cornwallis Rd., Research Triangle Park, NC 27709; 800-426-4968; fax, 800-947-4426.

Circle 953 on reader service card

Motorola Inc.

• Motorola Hybrid Modem TA 200

The Motorola Hybrid Modem TA 200 is a thoughtfully designed, feature-filled ISDN modem designed to handle both single-channel ISDN and analog modem connections. We also found it to be very easy to install and use.

Motorola Hybrid Modem TA 200



The Motorola TA 200 sports a nifty LCD display to convey configuration and call-status information.

The panel buttons make it very easy to configure the TA 200



The TA 200 has connectors for both RS-232 and V.35 interfaces.

The ISDN port connects directly to the ISDN line: An integrated NT1 device is built into the product.

Like the Hayes ISDN System Adapter, the TA 200 is an external unit that plugs into a serial port on the back of your PC. The TA 200, however, is the only product here that bundles an NT1 unit directly into

the device. With the other products you have to buy an NT1 device separately, at a cost of \$200 to \$300.

We were able to configure the TA 200 in a matter of minutes. It comes with an

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SEVEN INTEGRATED SUITES

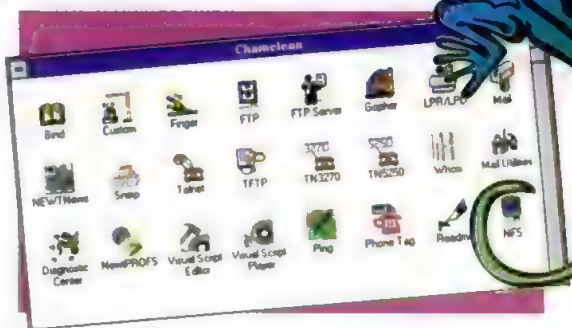
Terminal emulation, e-mail, file and printer sharing, remote access, network utilities, administration tools, and an easy point-and-click interface into the Internet.

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File & Printer Sharing
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Electronic Mail
SMTP Mail with MIME, Phone Tag, IBM PROFS, POP2, POP3, SMTP
Internet Access
Gopher, Newsreader, Whols
Network Utilities
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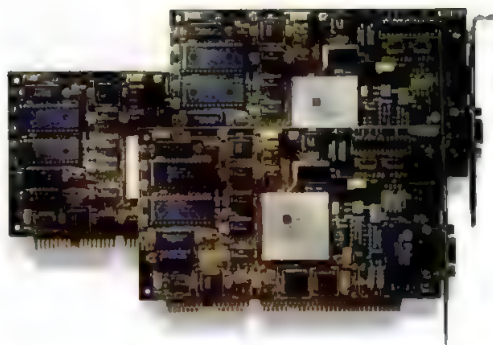
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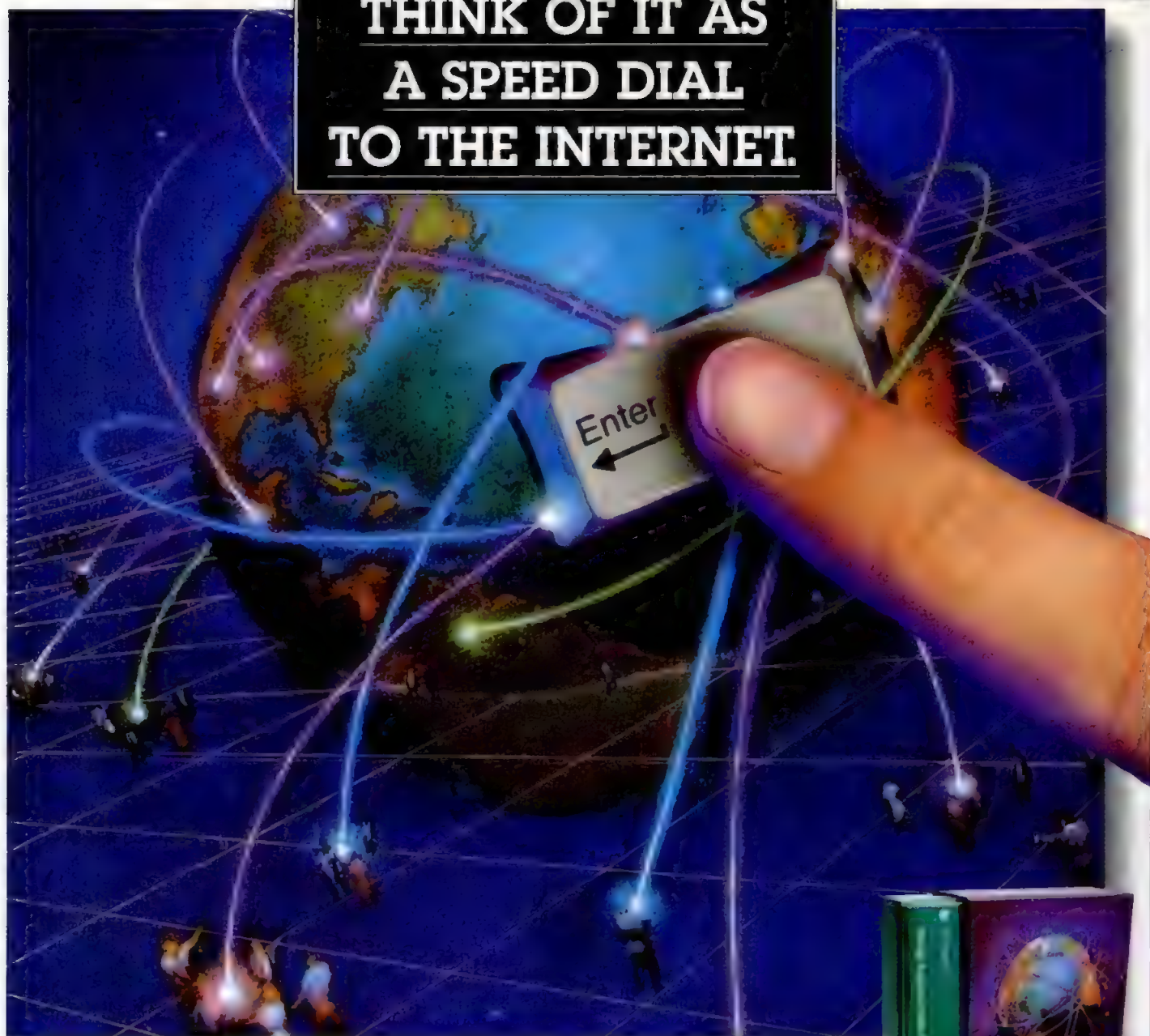


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CIRCLE 861 ON READER SERVICE CARD

intuitive Windows configuration program, and the clear documentation pointed us to the exact steps we needed to follow to get up and running. We were also able to configure our adapters using the front-panel buttons and the informative LCD panel, or by using ProComm Plus and standard AT commands.

Like the WaveRunner, the TA 200 lets you communicate with both ISDN and analog devices without having to supply your own analog modem. In our testing, we were able to talk with both analog modems at 14.4 Kbps and another TA 200 over ISDN without any problems. As with the other products, our ISDN connections used V.120 and supported only a single data B channel per call, with no compression. Unlike the WaveRunner, for analog calls the TA 200 supports V.42bis data compression.

IBM's WaveRunner supports synchronous PPP, but the TA 200 does not. As a result, with the TA 200 we were unable to connect to our ISDN Internet service provider, Internex (see the sidebar, "Supercharge Your Internet Access"). With the WaveRunner we were able to use NetManage's Internet Chameleon, and have WaveRunner software convert asynchronous SLIP data into synchronous PPP to connect to Internex.

The TA 200 also bundles FaxTalk-Plus, from Thought Communications, a basic fax software package, which we found to be very user friendly. Overall, we found the Motorola Hybrid Modem TA 200 to be well designed and fine for general purpose uses. We would like it even more, though, if it could combine both data B channels for one connection and if it supported ISDN data compression. For many, IBM's WaveRunner may prove to be a more versatile ISDN solution.

► **Motorola Hybrid Modem TA 200.** List price: \$895. Motorola Inc. (Transmission Products Division), 5000 Bradford Dr. Huntsville, AL 35805-1993; 800-451-2369; fax, 205-430-8926.

Circle 954 on reader service card

Our Contributors: JOHN GARRIS is a senior technical analyst at PC Magazine Labs. STEVE BUEHLER is the director of PC Labs West Coast.

► DOCUMENT MANAGEMENT

CabiNet Does It All (Almost)

BY TONY POMPILI

Looking to move closer to a paperless office? Check out CabiNet Systems' new CabiNet for Windows, Version 1.5b (\$1,395 for a three-user starter pack). This versatile package provides all of the document-management features you could ask for, in addition to top-notch security for NetWare LANs. CabiNet, however, offers limited mail support and no support at all for multiple servers.

CabiNet's list of features is impressive, ranging from simple document filing and version control of more than 100 different file formats to full-text search capabilities. You can also digitally sign documents with CabiNet, so that they cannot be modified. Other features include document-

names and access rights directly out of the Bindery but also to take advantage of NetWare security features. Other products, such as PC Docs Open, also use the Bindery for user information but not for providing integrated NetWare security.

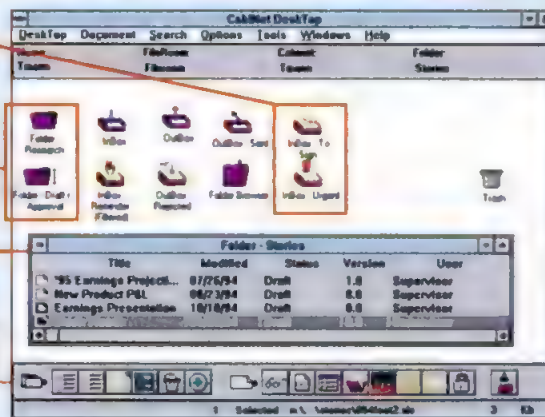
GETTING SET UP

Installation was simple. CabiNet read our user information from the Bindery and created CabiNet user groups accordingly. Any rights changes made to documents, folders, or users were updated in the Bindery to keep CabiNet and NetWare in sync. A CabiNet server is required to handle many of the product's intensive functions (such as mail routing), and we found it best to dedicate a Windows PC to this task.

Once we loaded CabiNet, we found its Windows-based interface fairly intuitive, although it was a bit confusing at first:

Documents Just a Mouse-Click Away

- 1 Place documents in CabiNet's routing boxes to move them between users.
- 2 Use the folders to store related documents and view access rights, modification status, and version numbers.
- 3 Pick a button from CabiNet's toolbar to access a document-viewing, annotating, security, or archiving utility.



scanning and -viewing utilities as well as an annotation feature that lets you attach notes to existing documents. Finally, CabiNet provides basic mail capabilities, but only between CabiNet users: There is no support for third-party mail systems.

Although it works with most network operating systems, CabiNet shines brightest with NetWare. This is because of a tight integration with NetWare 3.x, which enables CabiNet not only to read user

Some user training with the product is a must. The main screen, or DeskTop, consists of several folders and InBox and OutBox icons, as well as a menu and a button bar that provide access to all of CabiNet's features.

Network documents are stored in a public filing cabinet. Users can place documents in their own personal folders, which are typically used to track all the documents for a particular project or

assignment. Only one copy of each document actually exists, so multiple users can place a document into multiple folders.

New documents created in an application such as Lotus 1-2-3 or Microsoft Word can be imported at any time. Alternatively, you can create a new document from within CabiNet simply by launching the application you want, then creating a document as you normally would. The document you create will be stored automatically in the folder you specify. By using CabiNet's custom script-writing utility, you can also launch CabiNet from within another application. This feature, however, is poorly docu-

mented and takes a while to master.

The InBox and OutBox icons are used to send documents back and forth between CabiNet users. Some boxes have special functions, such as the Urgent box. Unfortunately CabiNet's proprietary document-routing system works only between CabiNet users, so you won't be able to route through an existing cc:Mail or Microsoft Mail system.

As with most document-management packages, CabiNet lets you index any text document and retrieve it with a full-text search feature. This makes it a snap to find documents stored in one or more folders. Another trait CabiNet shares with other

document-management packages is the inability to replicate documents across multiple servers, so CabiNet users must all be connected to the same server.

Overall, CabiNet is a powerful new entry in the document-management market. The wide array of features combined with airtight NetWare integration and security makes it a solid choice for most environments.

► **CabiNet for Windows, Version 1.5b.** List price: For three users, \$1,395; for each additional user, \$295. CabiNet Systems Inc., 900 Corporate Dr., Mahwah, NJ 07430; 201-512-1040; fax, 201-512-1650. Circle 958 on reader service card

► RAID SUBSYSTEM

Snap Together Storage from Digital

BY STEVE RIGNEY

Digital Equipment Corp.'s new StorageWorks RAID Array 210 has a lot to offer: It's affordable, it's easy to assemble and configure, and it is one of the first storage subsystems to support Microsoft Windows NT Server 3.5 networks. But it lacks an alarm notification feature, and the snap-together chassis is somewhat flimsy.

The RAID Array 210 provides up to 88GB of storage in an eight-slot, modular chassis. Basic configurations (\$6,999 to \$9,699) include a single-channel EISA RAID controller card, a single power supply, and three hard disk modules (either 1.05GB or 2.1GB). The power supply takes up one of the eight slots, so only seven are available for storage modules, which can be additional hard disks, CD-ROM drives, or DAT autoloaders (4 mm or 8 mm).

The RAID Array 210 ships with RAID software (Levels 0, 1, and 5) for both Windows NT 3.1 and 3.5 as well as NetWare 3.x and 4.x networks. Compared with other RAID products, the RAID Array 210 is very affordable. For example, you can configure the unit with 12GB for roughly \$15,000. A comparable Storage Dimensions LANstor SuperFlex Array would run you over \$20,000.

The array's chassis is built with plastic snap-together pieces: You don't need any tools. While we liked the concept, we had trouble snapping the pieces together. The plastic design also seemed a little too fragile for a cluttered wiring closet. In fact, when we picked up the system to move it, the whole thing almost fell apart.

The default RAID controller is Digital's single-channel RAID Array 211 controller, which supports up to seven SCSI devices. But you have to use a separate controller for each type of storage device. For example, if you want to put both DAT and hard disks in a single subsystem, you will have to use two controllers. Also, when using the RAID Array 211, you can install only two of these controllers in a single server and are therefore limited to less than 30GB. The higher capacity three-channel RAID Array 213 controller supports 21 SCSI devices. With two of these in your server, you can support up to 88GB worth of storage.

To test the RAID Array 210, we first

installed a RAID Array 211 controller in a ZDS Z-Server 433 DE, running Windows NT Server 3.5. We then configured the three drives in our chassis as a single RAID Level 5 logical drive. It was easy to change the configuration of the drives and readjust the RAID settings, but the process of reinitializing the drives and rebuilding the data takes 30 minutes to an hour.

The Windows NT-based management utilities are usable, but not quite as graphical or intuitive as some of Windows NT's native utilities. You can use the management utility to create new drive groups, fail a faulty drive, create a hot spare, and rebuild a replacement disk.

Unfortunately, the software does not notify the administrator if a disk drive fails—a feature we consider essential. If you don't keep your eyes on the monitor, you may never know unless the system crashes.

The RAID Array 210 is a good value for small to medium-size LANs. But the

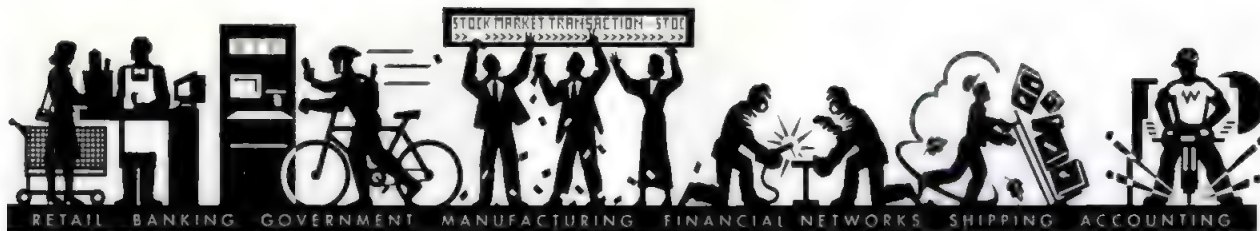
shaky construction and limited management utilities may limit its appeal.

► **StorageWorks RAID Array 210.** List price: \$9,699 (tested configuration). Digital Equipment Corp., 146 Main St., Maynard, MA 01754-2571; 800-344-4825, 508-493-5111; fax, 508-493-8780.

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NO TOOLS REQUIRED: The RAID Array 210's easy-to-assemble chassis is a bit flimsy.



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CIRCLE 878 ON READER SERVICE CARD

► ETHERNET SWITCH

Eliminating the Bottleneck

BY STEVE RIGNEY

Ethernet switches are currently the craze. But connect them and the server to the same old Ethernet link—and you've spent a few thousand dollars for nothing. Enter XNET Technology's new Series 1800 ParallelSwitch, the first six-port Ethernet switch to sit inside an EISA server. And with EISA running at 33MB per second, the link is much faster—and cheaper than Ethernet or even Fast Ethernet.

The ParallelSwitch is available in both ISA (\$1,988) and EISA (\$2,988) versions. It is currently compatible only with NetWare 3.x and 4.x, but XNET plans to deliver software drivers for other NOSs,

including Microsoft Windows NT Server 3.5, in the near future. We reviewed the EISA version. You can install up to four ParallelSwitches in a single file server. Because the ParallelSwitch uses a standard NetWare adapter driver, you can use it to replace your existing server adapters and add switching capabilities at the same time.

Like other recent products—such as Cisco's AccessPro PC Card—the ParallelSwitch uses VLSI chips to do the work of a large standalone switch on a single, small PC card. There's no rocket science involved, just a natural progression toward squeezing more power into less space.

If you've ever installed an ISA or EISA adapter, you'll find the ParallelSwitch very easy to install and configure. We installed the ParallelSwitch and loaded the NetWare

drivers in just a few minutes. In fact, because the ParallelSwitch connects directly to the server's bus, you won't have to pay for and install a second high-speed adapter in your server.

As a store-and-forward switch, the ParallelSwitch performs error correction and sends packets to their destination. As a rule, store-and-forward switches tend to be slower than cut-through switches due to the latency period, or extra time required to perform this error correction. But on our tests, the store-and-forward ParallelSwitch outperformed the cut-through Kalpana EtherSwitch EPS2015 RS. This is because the ParallelSwitch connects directly to the server's bus, while the Kalpana faces a bottleneck in the Ethernet connection.

For management, the ParallelSwitch ships with a server-based utility called SwitchCon. This is an NLM that lets you monitor and configure the individual ports on the ParallelSwitch. You can also use SwitchCon to set up filters based on network protocols and Ethernet addresses. An optional SNMP agent (\$288) allows you to

Ethernet. By the numbers.

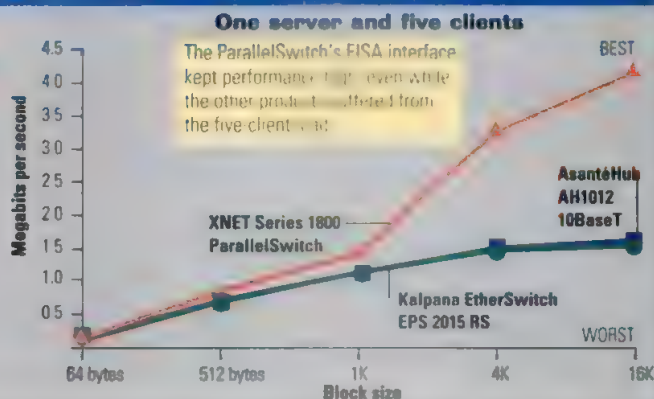
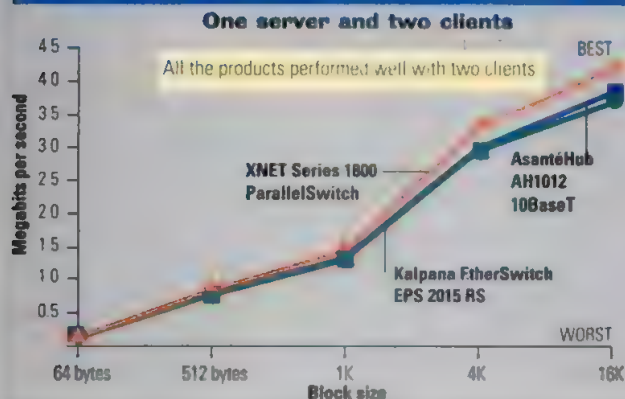


BENCHMARK TESTS: ETHERNET SWITCH ON A CARD

An internal high-speed interface can really boost network performance beyond the capacity of a 10-Mbps server link. Our NetWare 3.12 test-bed consisted of five clients—each a Compaq Deskpro 386N,

and a ZDS Z-Server 433 DE EISA with 10MB of RAM. We used the **NIC Throughput** test from NetBench 3.0 to measure the performance of each switch and hub with one server and two clients and with one server and five clients.

NIC THROUGHPUT



use a high-end management console to monitor and manage all of your ParallelSwitch adapters from one location.

All in all, there aren't many reasons not to like this card. Not only is it faster than

some external switches, but it can also save you the cost of a high-speed server adapter. It's a great switching solution for small to medium-size NetWare networks.

► **Series 1800 ParallelSwitch.** List price:

EISA UTP, \$2,988; ISA UTP, \$1,988; SNMP agent, \$288. XNET Technology, 426 S. Hillview Dr., Milpitas, CA 95035-5464; 408-263-6888; fax, 408-263-8898.

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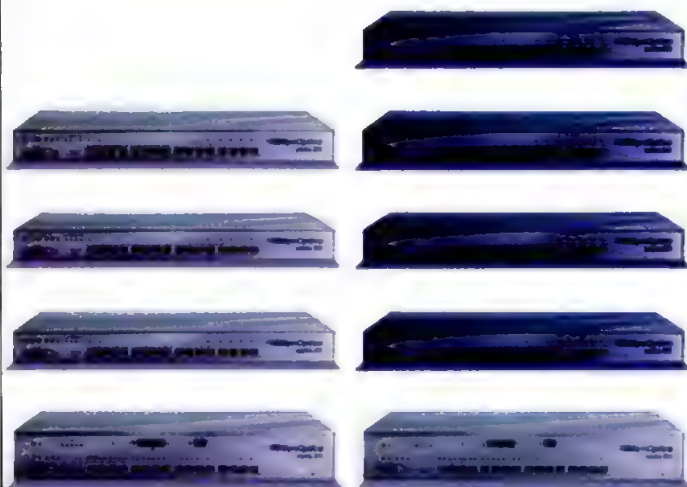
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CIRCLE 898 ON READER SERVICE CARD



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► ISDN INTERNETWORKING

Symplex's End to Leased-Line Woes

BY SHAWN F. KAFIPOUR

Looking for the most cost-effective way to connect your remote sites? Check out Symplex Communications Corp.'s new Direct Route series of internetworking devices. Direct Route is an alternative to leased-line routers that provides high-bandwidth, low-cost links to multiple sites.

There are three members of the Direct Route family: the DR1, DR2, and DR5. We looked at the \$2,999 DR1, which is intended for small to medium-size branch offices. The DR1 includes one Ethernet port and four ISDN Basic Rate Interface (BRI) ports. Since a BRI line comprises two separate 64-kilobit-per-second (64-Kbps) data channels, you can connect the DR1 to as many as eight separate sites simultaneously at 64 Kbps each, or a single site at a combined 512 Kbps. Through scalable bandwidth-on-demand, the DR1 can also communicate with from two to seven sites, using any number of available channels for each connection. (For information on other ISDN products, see "ISDN Sleight of Hand," page NE1.) If ISDN is unavailable in your area, you can still use the DR1 with frame-relay and leased-line services.

By utilizing multiple ISDN channels, the DR1 can provide as much or as little bandwidth as you need for a given connection. And because ISDN connections

are dropped when there is no traffic, you pay only for the time you actually use them. This is different from leased lines, which carry a fixed rate regardless of usage.

As with any ISDN product, the biggest

had to reconfigure our ISDN service so that our RBOC's switch—a Northern Telecom DMS-100—could communicate using the NI-1 specification that the DR1 uses. Even with this help, however, the process took several days.

Once we got our ISDN service off the ground, it took only a few minutes to configure the DR1. Through an out-of-band terminal session, we entered the phone numbers of our remote DR1s. The DR1 then automatically called each



drawback to the DR1 is the process of acquiring ISDN service. Because of this, Symplex maintains a "telco liaison team," which assists customers throughout the process. We found the telco liaison (and our local RBOC) very helpful when we

of them and detected all of the servers attached to each. When a request comes into the DR1 from the local network for one of these servers, the unit automatically dials the appropriate remote DR1 for access.

Like a bridge, the DR1 is protocol-independent and offers basic filtering capabilities. The DR1 can be managed via SNMP as well as telnet or direct-serial (out-of-band) connections.

If you want to boost WAN performance and lower costs, the DR1 and Direct Route are hard to beat.

► **Symplex Direct Route series.** List price: DR1, \$2,999; DR2, \$6,999; DR5, \$7,999. Symplex Communications Corp., 5 Research Dr., Ann Arbor, MI 48103; 313-995-1555; fax, 313-995-1564.

Circle 951 on reader service card

► SUMMARY OF FEATURES

Symplex Direct Route Series

Products listed in alphabetical order

■ = YES □ = NO

Modular chassis

Number of slots

Maximum number of LAN ports

Ethernet/Token-Ring support

Maximum number of WAN ports

ISDN BRI/PRI ports

Maximum number of sites accessible simultaneously

Maximum bandwidth to single site (Kbps)

N/A—Not applicable. The product does not have this feature

DR1	DR2	DR5
\$2,999	\$6,999	\$7,999
□	■	■
N/A	2	5
1	3	6
■ □	■ ■	■ ■
6	10	30
4, 0	8, 2	20, 5
8	64	160
512	1,024	1,024

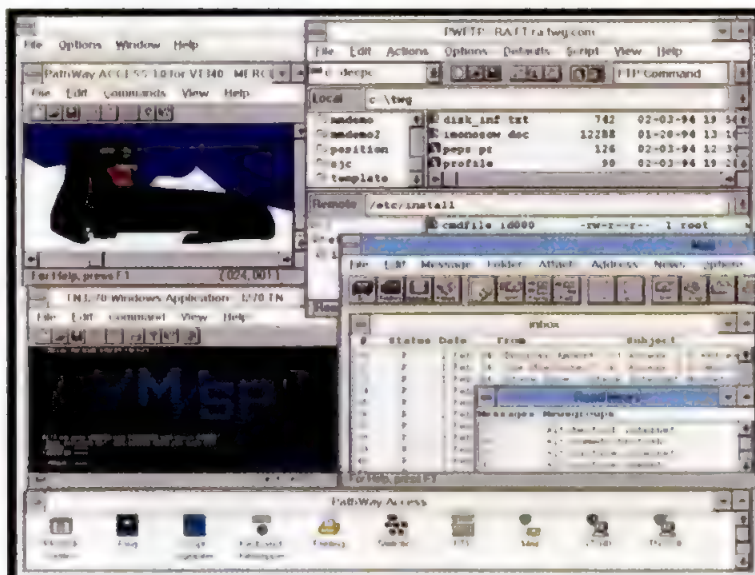
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CIRCLE 902 ON READER SERVICE CARD

Cookie-Cutter Training Meets Court TV

It had to happen eventually, I suppose. WordPerfect on Court TV, not in a battle of software giants but as part of a lawsuit. The plaintiff claimed she left her job because of sexual harassment. WordPerfect Corp. said she couldn't do the job, which consisted of being a legal secretary and using the company's very own word processor, WordPerfect 5.1.

This is obviously not the appropriate forum for arguing the merits of her legal claim (she did win). But whether or not the firm was guilty of the conduct for which it was being sued, it was definitely guilty of using a cookie-cutter approach to training that was bound to fail some people.

The plaintiff had no prior experience with WordPerfect, although she had used a dedicated word processor. The interviewer assured her that her lack of experience with WordPerfect was not a problem: The company would train her.

Since one of my biggest challenges as a fledgling LAN manager was moving secretaries from dedicated word processors to PCs, listening to her description of the experience was like déjà vu all over again. She reminded me of many of the employees, male and female, who have worked on my LANs over the years. Her second day on the job was the first of three consecutive days of WordPerfect training. The first day was the "beginning" course, the second "intermediate," and the third "advanced."

Such a schedule may work fine with people who have used several word processors over the years and just need to learn the peculiarities of another one. It is a waste of time otherwise. The attendees can't possibly absorb what they're learning because they have no time to apply it.

Moreover, it was obvious from her description of the experience that she's the kind of person, not uncommon, who can't easily learn or apply abstract concepts. She kept wanting to know how what she was being taught applied to her job. The course, as is also not uncommon, obviously focused only on the product.

As computer specialists we all too often vastly underestimate the effort required to learn applications. Worse, we not only ignore different learning styles, we tend to devalue people who can't learn the way we learn or as fast as we learn. It's wise to remember that those "numskulls" who can't grasp the most basic of computer skills are often wiz-



By Diane
Danielle

ards in their own jobs, jobs in which we'd probably flounder around like guppies.

I was, I admit, shocked back in those early days at the effort required for some of the secretaries to make the transition from their dedicated systems to a PC-based product, even though we had purposefully chosen a product similar to the ones they were familiar with.

To me, it was just a question of abstracting how, for example, copying paragraphs worked in product A versus product B. What I discovered was that many people have never had to figure out how to use their systems outside the context of their jobs. The word processor was a means to an end, not something to understand for its own sake.

This plaintiff needed somebody to show her how to set up a letter or whatever she was going to be doing with WordPerfect. She needed to associate abstract actions with concrete outputs. The problem is a common one.

For training to be effective, at least two basic criteria must be met. First, courses at different levels must be given at different times. Most people learn more from a class when they have specific questions based on the work they've been trying to do, rather than when they enter as blank slates.

Second, many people, like the woman in this lawsuit, cannot deal easily with abstract concepts. If they're learning a computer language, they need a specific project and concrete examples. Give them a sales system with fields such as "product name" and "price" and they can learn to write a program. Talk to them about a generic database and "field A" and "field B" and their eyes will glaze over—and they'll think you're from Mars.

Learning styles are not immutable. Many individuals who initially need concrete hooks to learn a particular product will adjust just fine to a more abstract approach—at least for that particular category.

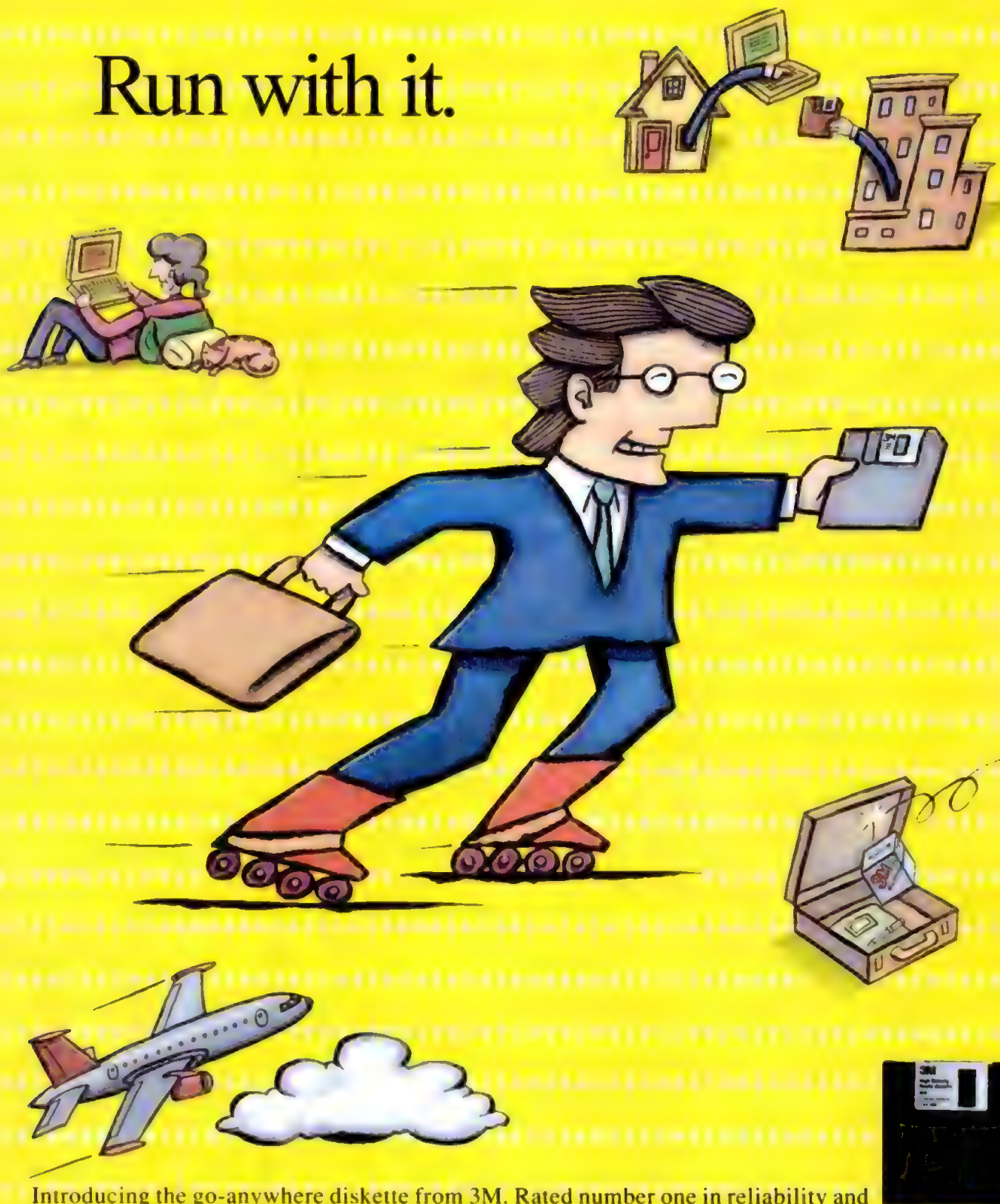
Small companies may not be able to offer tailor-made classes, but larger ones that have standardized on a set of products should make the effort. Courses that are based on the business at hand, rather than on the product, are bound to produce more productive employees faster. □



*Concrete examples, not
abstract concepts, are what you
need for effective training.*

DIANE DANIELLE is an independent networking consultant in Berkeley, California. She can be reached on CompuServe at 70020,645 or MCI Mail at 383-1159.

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CIRCLE 910 ON READER SERVICE CARD

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Are On-Line Services Off-Line?

Americans are getting tightly connected, David, and the connections are driving a lot of changes. On-line networking is infiltrating the popular-entertainment culture. Several TV "magazines" now invite viewers to send their comments through the Internet. You can meet on-line with the producers of the Fox Network's "The X-Files" to exchange views on characters and plots. Will conversations with daytime-soap stars be far behind?

A recent study conducted by CBD Research & Consulting found that while only 3 percent of Americans currently subscribe to on-line services, 73 percent have heard of Prodigy and 58 percent have heard of the Internet. The seeds are sprouting in people's minds. These folks will be the next wave of subscribers to those services—or to something like them.

I see the next evolutionary product in the on-line family, the Microsoft Network, poised to reap the benefits of on-line awareness. The Microsoft Network, with client-interface software bundled into Windows 95, has enough big-name magnetism to draw in many providers of interesting services. Microsoft is sure to win big on-line. In addition to the revenue the company gets for running the network, the on-line network also provides a great way to support, publicize, and peddle software.

I recently heard someone wonder out loud what we did before copy machines. Remember that through the 1960s if you wanted several copies of something you either cut a stencil, photographed the document for offset printing, or handled some smelly chemicals. (Ah, the smell of ditto fluid in the morning!) It was difficult to reproduce and distribute information, but we could keep up because things moved more slowly. Perhaps we can participate in the 18-month technology cycles described by Moore's Law only because we have the technology to distribute the information electronically within those cycles.

Information is unique, because it isn't consumed when you use it. If people can add to and modify information through on-line services, its value grows. If, however, you have a social conscience, the downside of the information age is the large difference between the info-haves and the info-have-nots. The information have-nots have great barriers keeping them from reaching their potential.



Frank Derfler:
*Information isn't
consumed when used.
If people can modify
it on-line, its
value grows.*

Wow, Frank. Somebody's head is stuck in the Cybernet. It's precisely because conversations with soap stars aren't far behind that I think on-line services have a long way to go. Not that they're useless; I hang out on CompuServe and the Internet (my favorite haunts) as much as the next person. I'm just continually astonished by how much junk there is on-line—and how little is really useful.

It's not just that there isn't data you can really use out there. Often the data that is out there is difficult if not impossible to find. We know this is the problem with the Internet: Have you tried using the Web to find specific information?

But even with on-line services—like America Online (AOL)—finding the right information can be grueling. The

other day, my friend Natan was researching a paper on Islamic views of corporal punishment and women's rights. When we ran a search on AOL for all articles indexed under *women's rights* and *Islamic views on punishment*, we found nothing. You'd think that something as common as *women's rights* would return something.

A search on *Islam* did return a few dozen documents, but who wants to sift through that data? And herein lies the problem. Data is the raw material of information. Processing data into information requires

sifting through the data and presenting it in a way that's understandable to the user. No doubt future on-line services will address these points more strongly.

In the meantime I see great promise for other means of electronic publishing. CD-ROMs—like our own home brew—might not give you the real-time angle of on-line, but the format, the interface, and the search tools are definitely there.

This is really the point, after all. News feeds and press releases have been available before, but how many people want to sit around and read the AP wire?

We want more than just data, Frank. We want *packaged* data. This is the kind of real information that we get in magazines. This information is sifted through by experts (writers), packaged by experts (editors), and illustrated by experts (artists). This saves us the time and energy of having to do that work ourselves. On-line still can't come close to that total experience. Until it does, Frank, the on-line "revolution" will remain an on-line evolution. □



David Greenfield:
*Processing data into
information requires
sifting, and present-
ing it in an under-
standable way.*

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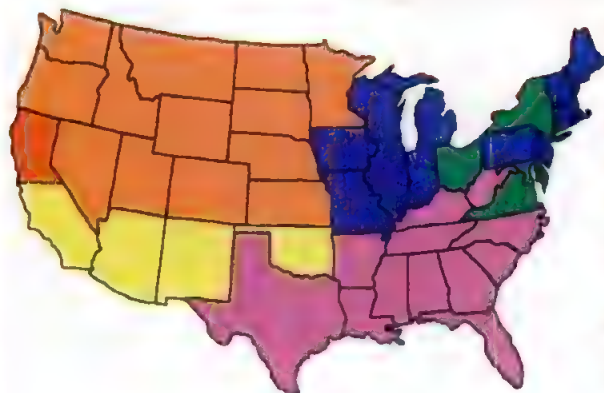
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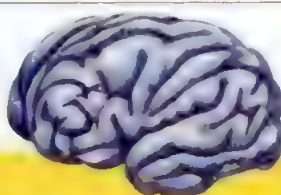
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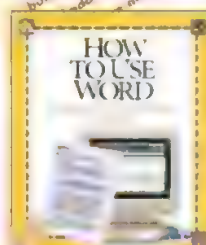
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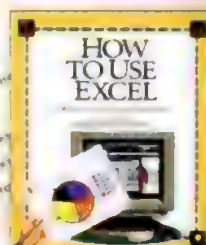
A mouse is a device that provides instructions to the computer. You're probably familiar with the keyboard, the most common input device. A mouse is named for its hand-held nature and its long tail-like cable. It's a device that works along with the keyboard to control the computer. Although it's possible to get by with just a mouse and do all your work, the Windows interface was designed with the mouse in mind. It's not always easy to find out what they are. Take a few minutes to learn the major mouse moves and you'll reward yourself with a smoother computing experience.

TIP SHEET

Unless told otherwise, use the left mouse button. The other mouse buttons are used to infrequently windows that when they are always told about it.



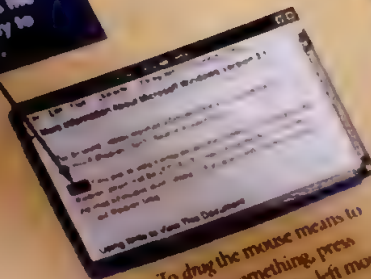
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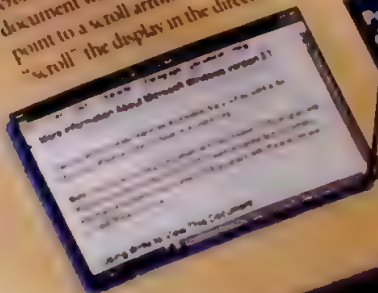
2 To click on something means to point to it with the mouse so the mouse pointer is on top of it and then press and instantly release the left mouse button. To double-click on something means to point to it and then click the left mouse button twice in rapid succession.

Drag across a word to select it. Then press the Delete key to delete it.

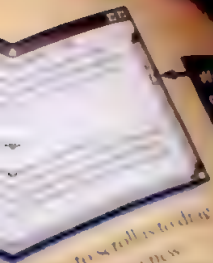


3 To drag the mouse means to point to something, press and hold down the left mouse button, roll the mouse, and then release the mouse button. For example, you can "select" a block of text for deletion by dragging from one end of the block to the other.

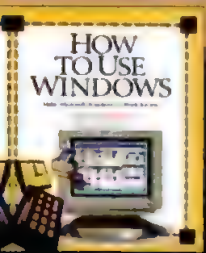
4 Scrolling is one of the most common mouse actions. When a document window cannot accommodate all its contents at once, point to a scroll arrow and hold down the left mouse button to "scroll" the display in the direction of the arrow.



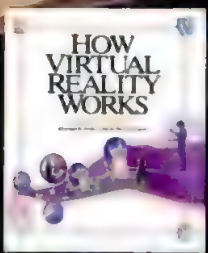
Point here and hold down the left mouse button to scroll down through the document.



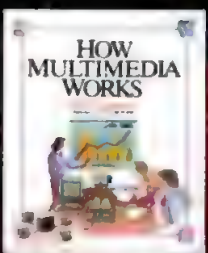
One way to scroll is to drag a scroll button to a new position along the scrollbar. The position of the scrollbar button suggests what part of the contents you are viewing.



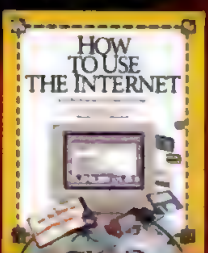
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User-to-User

BY NEIL J. RUBENKING

More Memory for DOS 6.x Users

I think I may have found a new, undocumented CONFIG.SYS command in MS-DOS 6.22: INSTALLHIGH. I don't have the printed manual, but I do have the Microsoft Developer Network CD-ROM collection (which includes DOS 6.22) and the command is not documented there or in the on-line help. Presumably the syntax for INSTALLHIGH is the same as for DEVICEHIGH= and it works the same as INSTALL= except that the new command installs the program in an upper memory block.

Joel M. Rubin
San Francisco, California

► **PC MAGAZINE:** The INSTALL= command, introduced in DOS 4.0, lets you load RAM-resident programs (TSRs) during the processing of CONFIG.SYS rather than waiting for AUTOEXEC.BAT to execute. INSTALL= lines are handled after everything else in CONFIG.SYS, so you can't use this command to get a specified

```
@ECHO OFF
REM ENVUSE.BAT - check amount of environment in use
IF '%1'=='$$$' GOTO Report
REM The temporary file 'MUST' have the same file name
REM as this batch file, but a different extension
SET > ENVUSE.$$$
DIR ENVUSE.$$$ | FIND "ENVUSE $$$" > TEMPENVU.BAT
TEMPENVU
:==== Report ====
ECHO Bytes of environment in use: %2 plus 1 minus
TYPE ENVUSE.$$$ | FIND /C "="
DEL ENVUSE.$$$
DEL TEMPENVU.BAT
```

Figure 1: ENVUSE.BAT reports the amount of environment space in use calculated as the number of bytes in the output of SET minus the number of environment variables.

TSR loaded before a particular device driver. The real reason to use INSTALL= is to save memory. Just how much you can save depends on how full your environment is.

When DOS loads a program, it creates a copy of the in-use portion of the environment for the program's use. When the program is a TSR, the copy of the environment remains in memory with the TSR. However, a TSR loaded with INSTALL= doesn't get a copy of the environment. For all but the very rare TSR that needs access to the environment, you can save memory by loading with INSTALL=. How much memory? Run ENVUSE.BAT (Figure 1) to see. This batch file takes advantage of the fact that environment variables are stored in memory similarly to the way

the output of the SET command is stored in a file. If ENVUSE.BAT reports 256 bytes of environment in use, for example, you can save 1K of conventional memory by moving four TSRs from AUTOEXEC.BAT to INSTALL= lines in CONFIG.SYS.

DOS 5.0's introduction of the LOADHIGH command, which loads TSRs into upper memory blocks, effectively rendered INSTALL= useless. There's really no point in eking out a few bytes of memory with INSTALL= when you can load the whole TSR outside con-

ventional memory using LOADHIGH. With DOS 6.0, the undocumented INSTALLHIGH= command gives the best of both worlds. It loads your TSRs in upper memory and refrains from wasting space on copies of the environment. Do note that the /L and /S command-line switches that were added to LOADHIGH and DEVICEHIGH= in

DOS 6.0 are not supported by INSTALLHIGH=.

Use a Paintbrush Quirk to Capture Help Screens

The COPY command in WINHELP.EXE permits the copying of only plain text. It has always been difficult to copy fragments from help files and convert them to bitmaps. But that problem can be solved by exploiting a bug in the Paintbrush program (included with Microsoft Windows). Here's how.

Start Paintbrush and maximize it. Then choose Contents from the Help menu. This will execute WINHELP

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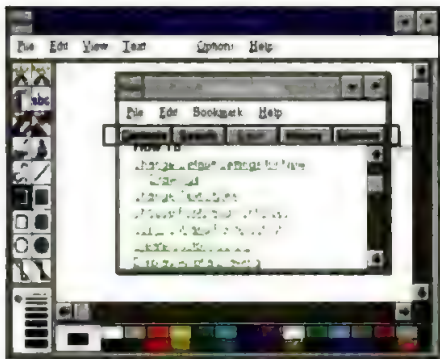


Figure 2: When the Always on Top help screen is moved, a copy of the portion enclosed by the rectangle will remain in the Paintbrush picture.

.EXE with Paintbrush's help file. (We will paste from that help file into Paintbrush). In the Help menu of WINHELP, enable the Always on Top option. Make the window smaller, and place it in the middle of the Paintbrush drawing area. Then select the Filled Box tool, and draw a rectangle that would cover the WINHELP window. Minimize WINHELP. As you see, a copy of the WINHELP window remains in the drawing area of Paintbrush. Now you can process the image as you like.

The same effect happens with almost all the other drawing tools. With the aid of the eraser, you can erase the part of the window that you don't want in your drawing, keeping the useful part.

*Simos Ksenitellis
Peristeri, Greece*

► **PC MAGAZINE:** Of course, it's possible to capture an image of the active window of a Windows program by pressing Alt-PrtScr. This copies the window to the Clipboard, and from there you can paste it into Paintbrush, or into the bitmap editor of your choice. Still, this new technique is interesting, and you can make any program Always on Top using PC Magazine's TOTOP utility.

It's also possible to snip just a portion of the image into Paintbrush. The only requirement is that the rectangular area to be saved must begin outside the floating window. For example, try the

steps listed above, but instead of drawing a rectangle that encompasses the whole help window, draw one that includes just the button bar, as shown in Figure 2.

Unzipping from Windows

After using a few utilities (and writing one myself) to unzip files from Microsoft Windows, I realized that the easiest way was to make use of Windows' File Manager. By creating a file association in WIN.INI for .ZIP files, you can unzip files by just double-clicking on them in File Manager. Thus, you can manipulate all your files and directories and then unzip them in just one place.

In WIN.INI just add the following to the [Extensions] section:

```
zip=c:\pkzip\pkunzip.exe *.zip
```

Naturally you should substitute your own full path to PKUNZIP.EXE.

The method does limit you to basic unzipping without using any of the options switches, but most people don't use the options much of the time.

*Pete Jordan
Shorham, New York*

```
@ECHO OFF
ECHO ZIP action for %1:
ECHO V - View contents
ECHO U - Unzip contents
ECHO F - Freshen (update contents from newer files)
ECHO M - Move unzipped files back into ZIP
ECHO.
CHOICE /C:VUFM
FOR %n IN (0 1 2 3 4 255) DO IF ERRORLEVEL %n GOTO Label%n

:Label0
:Label255
ECHO Operation cancelled
GOTO End

:Label1
PKZIP -v %1 | MORE
GOTO End

:Label2
PKUNZIP %1
GOTO End

:Label3
PKZIP -F %1
GOTO End

:Label4
PKZIP -MF %1

:End
PAUSE
```

Figure 3: PKDOZIP.BAT lets you unzip files without leaving Windows.

► **PC MAGAZINE:** Doing all of your manipulation of .ZIP files in File Manager is an attractive prospect. Say you've just downloaded a new shareware application as a .ZIP file. You can create a new directory, move the .ZIP file to that directory, double-click on it to decompress the contents, and delete the .ZIP file, all without leaving File Manager. Note that you don't have to edit WIN.INI to create the association—you can do that right in File Manager too. Highlight any .ZIP file, select Associate from the File menu, and press the Browse button in the resulting dialog. Locate and select PKUNZIP.EXE, then press OK twice to complete the association.

If you generally treat .ZIP files as containers, discarding them after you've extracted the contents, this is all you'll need. But if you tend to move files into and out of .ZIP file archives, you may want the flexibility provided by PKDOZIP.BAT (Figure 3). (It's available on PC MagNet as PKDOZI.ZIP.) You can use PKDOZIP to view the contents of a .ZIP file, unzip the contents, freshen the .ZIP file (by updating any files for which the nonzipped version is newer), or move the contents back into the .ZIP. The last two choices necessarily assume that the .ZIP file and its de-

compressed contents reside in the same directory. Just associate PKDOZIP.BAT with the .ZIP extension in File Manager.

To fine-tune PKDOZIP.BAT's behavior, you can create a .PIF file for it. Launch the PIF Editor, usually found in Program Manager's Main group. Enter the full path name for PKDOZIP.BAT in the Program Filename field, and a title like PKUNZIP in the Window Title field. Click the Windowed option button so the batch file will execute in a window, and put an X in the Close Window on Exit check box. Save the result as PKDOZIP.PIF, and use File Manager to associate .ZIP files with this .PIF file. □



Tutor

BY JEFF PROSISE

Inside the Windows Palette Manager

If you run Microsoft Windows on a system with a 256-color display, you may have noticed a strange phenomenon. When you run two applications that display two different 256-color bitmaps, one of the bitmaps becomes color-corrupted. Some colors get washed out, while others take on noticeably darker hues. Switching to the application with the corrupted bitmap restores its colors, but then the other bitmap becomes color-corrupted. It seems there's no way to win. No matter what you do, it's impossible to get the two bitmaps to display correctly side by side.

What you are seeing is an example of software demanding more colors than the hardware can display. Many video adapters are capable of displaying millions of different colors, but can display only 256 different colors at a time. Put two 256-color bitmaps on the same screen on one of these adapters and—unless both images happen to use the same 256 colors—something's got to give.

DOS applications typically deal with the problem by letting you display only one bitmap at a time and by programming the adapter's color registers (internal memory locations whose values determine the colors displayed on the screen) to the 256 colors contained in the bitmap. A windowed operating system requires more complicated measures, because two or more graphics programs may be running at the same time, each wanting to use the full color capabilities of the video hardware.

To meet the conflicting needs of its

client application programs in a color-limited environment, Windows provides the Windows *palette manager*. The palette manager is built into the Windows GDI (Graphics Device Interface) module, which is responsible for just about everything that happens on the screen. Windows applications are forbidden to program the video adapter's color registers directly; they must go through the palette manager.

The palette manager serves as an arbitrator when two or more applications have conflicting color requirements, ensuring that the application in the foreground has priority over applications running in the background. That's why colors on the screen sometimes shift when you switch

from one Windows application to another. This doesn't happen in video modes that don't use 256 colors, because Windows doesn't use a palette in 16-color video adapters, and palettes aren't required on 15-, 16-, and 24-bit (true color) adapters, which display 32,768, 65,536, and 16.7 million colors, respectively.

Though not often discussed outside of programming literature, the palette manager provides an intriguing look into the inner workings of Windows itself. Pull up a chair and follow along as we discuss this ob-

scure but very important part of Windows.

PHYSICAL VS. LOGICAL For starters, let's define what we mean by *palette*. A palette is a selection of colors. When an artist prepares to paint a picture on a piece of canvas, he assembles a palette of colors to work with. Graphics programs work the same way, except that they create a palette by writing red, green, and blue (RGB) color values to color registers in the video adapter. Typically, each color's red, green, and blue intensity is expressed as a number from 0 to 255. Lower numbers correspond to darker colors, while higher numbers mean brighter colors. The RGB triple 0, 0, 0 corresponds to black and 255, 255, 255 corresponds to white.

Once the colors are programmed into the color registers, they are referred to by number. If the first set of color registers contains 192, 0, 0, then color number 0 is medium-intensity red. If the second set holds 0, 255, 0, then color number 1 is bright green. Programming all 256 sets of color registers produces a 256-color palette with individual colors numbered

from 0 to 255. If color number 100 is assigned to an RGB combination that produces a shade of orange, then poking a 100 into a certain place in the video buffer will light the corresponding pixel that shade of orange. (The video buffer is video-adapter RAM where the color values for each pixel on the display are stored.)

A palette programmed directly into the video adapter is called a *physical palette*. Windows refers to this as a *system palette*. DOS-based programs such as Autodesk 3D Studio frequently use physical palettes to serve their needs. Windows programs, however, don't have that option; they use *logical palettes* instead. A logical palette is a GDI object that the palette manager creates at an application's request. It is basically a list of colors that the application uses. At any time, an application that owns a logical palette can *realize* the palette by ask-

Though not often discussed outside of programming literature, the palette manager provides an intriguing look into the inner workings of Windows itself.

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ing the palette manager to copy the colors in the logical palette to the system palette.

When a foreground application realizes its logical palette, the palette manager gives it priority over everything else. Of the 256 entries in the system palette, the palette manager will fill up to 236 of them with colors from the application's logical palette. The other 20 palette entries—entries 0 through 9 and 245 to 254—are reserved for "standard" colors such as the red and blue that Windows keeps on hand for drawing title bars, window borders, and other user interface elements. These 20 colors are known as the *static colors*. Windows also uses the static colors to fulfill the color needs of programs that do not use logical palettes.

The palette manager provides a special function, named `SetSystemPaletteUse`, that an application may call to take over all but two of the 20 palette entries reserved for static colors. This function is rarely used, however, because it causes all sorts of problems, not the least of which is that changing the static colors adversely affects every other program in the system.

When a background application realizes a palette, the palette manager maps as many entries as it can from the logical palette to unused entries in the system palette. The palette manager goes through the colors in order, starting with palette entry number 0. (Thus, applications can improve their color output by putting the most important colors first in the palette.) The palette manager will not, however, allow a background application to overwrite colors placed there by the foreground application. If the foreground application realized a 256-color palette, there are no unused entries. But if its palette contained only 128 colors, then that leaves 108 palette entries for background applications to use.

When there is no more room in the system palette and there are colors yet to be realized, the palette manager uses a simple color-matching algorithm to correlate the remaining colors to existing colors in the system palette. The static colors help again by ensuring that there are no gross disparities; an unusual shade of red in the logical palette can always be represented by a standard shade of red in the static colors, for example. In the event that there is more than one background

application, each gets a crack at the system palette with priority determined by *z*-order—the value of *z* being a window's depth into the screen relative to other windows.

How does a Windows application know when to realize its palette? Through messages, of course. Windows is a message-based operating system; at any given moment, messages are flying back and forth in the system at a rate of 20 or more per second. Most of the messages notify applications about important events, such as the click of a mouse button or the need for a program to repaint its window.

Two messages figure prominently in

any unused entries in the system palette and corrects many of the obvious mismatches between the colors of the pixels in the window and the colors in the modified system palette.

HANDS-ON PALETTE USAGE So that you can see firsthand the palette manipulations that go on behind the scenes in a 256-color system, I wrote a small program called VP (for Visual Palette) that displays the colors in the system palette and updates its display whenever the system palette changes. You can download VP free of charge from the PCMag Utilities library (Lib 1) of PC MagNet's FREEUTIL Forum. After 30 days, the program

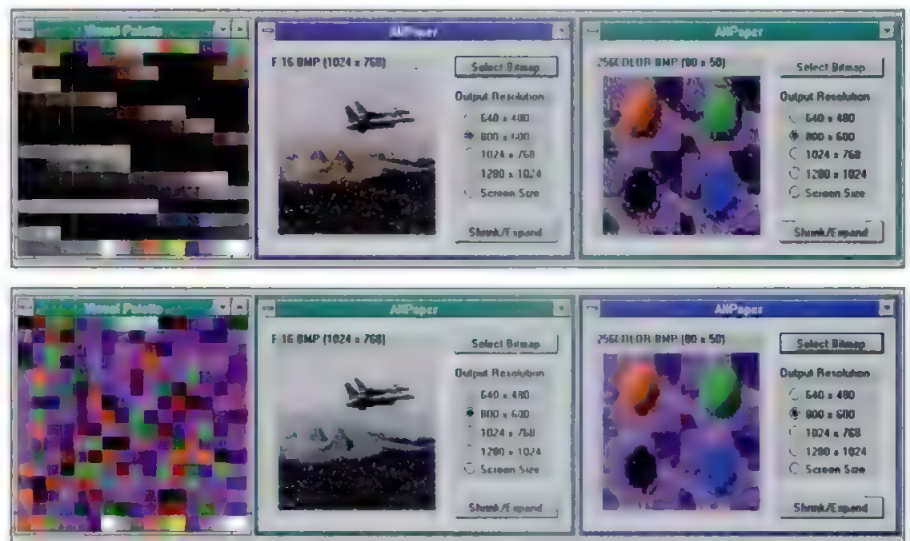


Figure 1: VP reveals how Windows' system palette changes when the user switches between two applications displaying 256-color bitmaps in a 256-color system. When the window in the middle is activated (top), the system palette assumes the earthy tones of that bitmap. When the window on the right is activated (bottom), the palette changes to accommodate that window's purplish hues.

palette usage: `WM_QUERYNEWPALETTE` and `WM_PALETTECHANGED`. Windows sends the former to a window just before bringing it to the foreground. This is Windows' way of saying "Realize your logical palette now, and I'll remap the system palette to accommodate your needs." Windows sends the latter message to background windows when a foreground window realizes its palette and thereby forces a change in the system palette. In either case, an application's usual response is to realize its palette and repaint its window. For a foreground window, realizing the palette and repainting ensures a reasonably accurate color representation. For background windows, realizing and repainting takes advantage of

will be transferred to the Tutor library (Lib 3) in the Utilities/Tips Forum (GO TIPS), where it will find a permanent home. You can run VP on any PC running Windows, but you won't see much unless you're using a 256-color video driver.

To see VP in action, start it up and size the window to your liking. Then move it to one corner of the screen. Next, start two instances of Paintbrush or a similar application and load a pair of 256-color bitmaps.

(Windows comes with one 256-color bitmap: `256COLOR.BMP`. If you don't have another, you can still see the palette change when `256COLOR.BMP` is loaded.) As you click back and forth between the two windows, notice the effect

on the system palette. It changes to match the colors in the active window's bitmap. Figure 1 shows one example of how the system palette changes as the user toggles between two instances of *PC Magazine's* AllPaper utility.

VP displays the 256 system palette colors in a 16-by-16 grid. The top row depicts colors 0 through 15, the second row colors 16 to 31, and so on. To view the red, green, and blue color components of any palette entry, click a color in the VP window with the left mouse button. VP will pop up a message box revealing the color's palette index and RGB values. You can also use VP to find out which applications use logical palettes and which don't. If VP's display doesn't change as you put a program through its paces, that's a pretty good indication that the program doesn't use a logical palette.

As you watch the colors in the VP window, note that the first ten colors in the top row and the last ten in the bottom row do not change; these are the static colors. The palette manager divides the static colors into two groups and locates the groups

at opposite ends so that flipping the bits in a static color's palette index (a common technique for inverting a color) will yield the palette index of a complementary color. The color swatches in the upper-left and lower-right corners of the window never change, because Windows always reserves these slots for black and white, respectively.

PICKING THE RIGHT COLORS The palette manager makes Windows a better operating system, because it allows application programs to take full advantage of the color capabilities of the video hardware—and to do so in a cooperative manner. It also makes life easier for programmers, who don't have to write a different set of palette routines for every video adapter their applications will run on. But Windows doesn't totally absolve applications of responsibility for color output. It's still up to each program to tell the palette manager what colors it needs.

Sometimes that's easy. When AllPaper loads a 256-color .BMP file, for example, it creates a logical palette from the 256 colors stored in the file header. Other

times it's not so easy. What happens if a program running on a 256-color system is asked to display a true-color .BMP file containing hundreds of thousands of different colors? AllPaper takes the simple approach of generating a logical palette with an even distribution of colors; it relies on Windows to match the colors in the bitmap to the colors in the palette as best it can. More sophisticated programs like Adobe Photoshop use a technique called *color quantization* to pick the 256 palette colors that will yield the best image. They may even *dither* the image (that is, arrange pixels of different colors) to create the illusion of more colors.

Used together, color quantization and dithering can make a PC that displays 256 colors look almost as good as one that displays millions. In the next Tutor column, we'll discuss color quantization and dithering in more detail. In particular, we'll look at quantization and dithering algorithms that are widely used by professional image processing programs, and at the dramatic effect that they have on image quality. □



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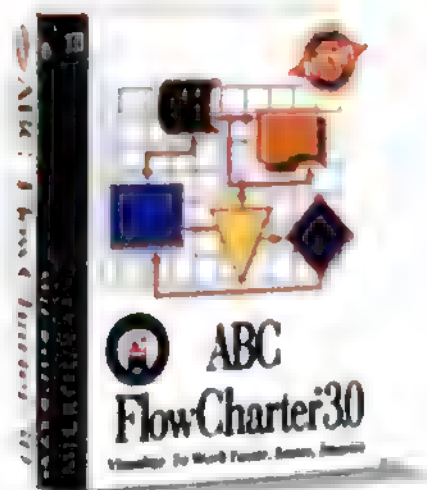
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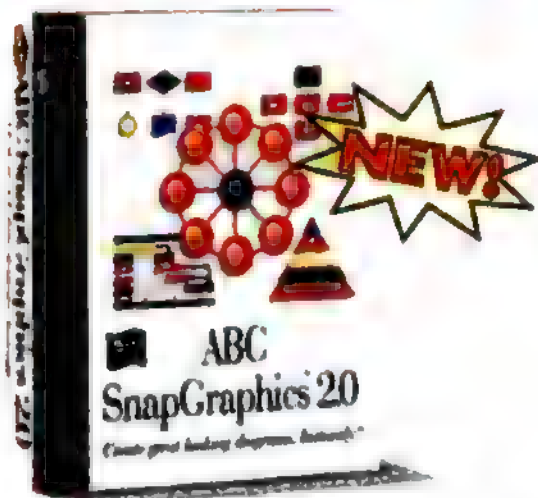
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CIRCLE 361 ON READER SERVICE CARD

Extending Your Apps

BY LUISA SIMONE

PageMaker 5.0's Script Language

All of us like to think of desktop publishing as an art—an expression of our personal talent and exquisite good taste. But when it comes to the nitty-gritty process of cranking out publications, desktop publishing is more like a business than an art. And like every business, it must address such mundane issues as increased productivity and faster turnaround. Professional designers are constantly on the lookout for specialized tools that can handle such tedious tasks as aligning multiple objects, building page grids, and creating consistent drop shadows. Corporate users, on the other hand, want workgroup functions that allow multiple authors to contribute to a single publication and that support automatic data exchange.

Aldus PageMaker, Version 5.0, responds to these diverse needs with its Aldus Additions technology. Many users are already familiar with Aldus Additions in the form of commercially developed third-party utilities. You can, for example, purchase Additions that align multiple objects in relation to one another (PageTools, from Extensis Corp., \$99), that assign predefined typographic styles to individual words in a paragraph (Mapsoft Type Styles, from Mapsoft Computer Services, \$49), and that combine two or more jobs on a single sheet of Linotronic film (MarksMaker, from Sundae Software, \$79). For more information about third-party Additions, call the Aldus Developers Cooperative at 800-685-3547. The folks there will send you a free catalogue.

This issue's Extending Your Apps concerns one specific feature of Aldus Additions: the scripting language that enables

even a nonprogramming end user to automate repetitive tasks within PageMaker 5.0. (I'll assume that you have a working knowledge of PageMaker's regular functions and that you're familiar with basic design concepts.)

INTERNAL VS. EXTERNAL SCRIPTS PageMaker supports two basic types of scripts. Internal scripts, invoked via the Run Script Addition, are simple ASCII files that contain commands and appropriate parameters. For example, the Move command requires that you specify two logical parameters: the handle by which you want to drag a selected object and the x,y-coordinates to which it should be moved.

External scripts, which are run from within other programs, communicate with PageMaker via the Dynamic Data Exchange (DDE) messages of Windows 3.1. When used in conjunction with development tools that offer control structures (such as the if-then or repeat-until statements of Microsoft Visual Basic), PageMaker scripts can be very powerful, indeed. That's because external scripts can contain both commands and queries. You can thus query PageMaker about the status of a document and then perform operations based on PageMaker's response. For example, you could query PageMaker about the number of pages in a document and then loop through a subroutine that creates the appropriate number of running page headers. External scripts

needn't be that complex, of course. You can perform many useful tasks with a straightforward script that sends only commands and data from a standard business application such as Microsoft Excel to a PageMaker publication.

Writing an external script does require that you know how to initiate DDE messages from within your application. Indeed, that's actually the most difficult part of the task. As you'll see below, PageMaker's scripting language is easily mastered, because it uses self-explanatory commands to automate desktop publishing tasks. I'll use three separate scripts to examine PageMaker's scripting language. The scripts illustrate the three different methods of execution; all of them can be downloaded from PC MagNet.

By way of overview, a selected portion of the first script, GRIDS.TXT (Figure 1), is imported into PageMaker; only the highlighted section of the script is run at any one time. This allows you to store many small subroutines in a single text file. The second script, BLUEBOX.TXT (Figure 2), is also an internal script, since it is in-

The Aldus Additions scripting language enables even a nonprogramming end user to automate repetitive tasks within PageMaker 5.0.

invoked from within PageMaker. The file itself, however, is stored on-disk. The advantage of this is that the instructions in the script can be applied to an object selected with the mouse. The third script, TABLE1.XLS (Figure 3), is an Excel macro and is obviously an external script. It imports data into

PageMaker and positions it on the page. These three examples illustrate the three different reasons for writing a script: overcoming one of PageMaker's few functional shortcomings, automating a repetitive task, and shielding users from the design process.

QUICK-CHANGE GRIDS Anyone who has ever tried to create a complex document with three or four standard page layouts has bemoaned the fact that PageMaker provides only two master pages, left and right. Competing products—notably QuarkXPress—let you create many different master pages to accommodate such things as varying column widths, partial

page ads, and editorial sidebars. Veteran PageMaker users have learned to compensate by creating compound grids that are based on a multiple of all possible column combinations. For example, a publication containing two-column and three-column pages is typically set up as a six-column grid. This solution, however, works only when you are dealing with a relatively low number of evenly-spaced columns. Once your layouts include four or five columns, custom column widths, or horizontal rows, the workaround is no longer very effective.

GRIDS.TXT provides an elegant solution for complex publications. The three

distinct sections of this script allow you to choose among a three-column grid for text, a four-column grid for directory listings, and a custom column/row grid for catalog work. To use GRIDS.TXT, you simply place the ASCII text file onto PageMaker's pasteboard. (The script is always available for use because PageMaker's pasteboard functions as a holding area; objects positioned on it do not disappear when you move between pages.) Then, using PageMaker's standard text tool, highlight the portion of the script you want to run.

For example, to create a new page

using a four-column grid, highlight the center section of the script, as shown in Figure 4. Open the Utilities menu and, under the Aldus Additions item, select the Run Script Addition. In the Run Script dialog box, be sure that the Selection item is checked. Click OK, and in no time at all PageMaker 5.0 will insert a new page into your document and set up the appropriate column guides.

AUTOMATIC DROP SHADOWS Drop shadows are commonly used to add visual interest to boxed text, boxed tables, or picture frames. They're also a labor-intensive design motif. You must draw each box individually, duplicate it, assign a gray tint to the duplicate, and reposition this second box to create the shadow. You can, of course, take advantage of PageMaker 5.0's new features to create "master" objects. Storing master objects in the Library Palette allows you to reuse them with a simple drag-and-drop operation. And you can use the Control Palette to resize and reposition objects accurately. But even with these conveniences, you'll spend a fair amount of time and effort tweaking the box and its drop shadow.

As an alternative, you can generate drop shadows automatically using the BLUEBOX.TXT script. BLUEBOX.TXT is an internal script because it is invoked from within PageMaker. The script itself, however, is separately stored on disk. Running a script from a disk-based text file allows you to perform operations on an object that you select (or draw, in this case) with a mouse. Because all of the commands in this script act upon the currently selected object, the drop shadow is always the right size, the right shape, and in the right position for whatever size box you make.

First, copy the BLUEBOX.TXT file, to a convenient location on your hard disk. To run the script, open a new PageMaker document. Using the rectangle tool, draw a box of any size or shape. Making sure that the box is selected, open the Utilities menu, and under the Aldus Additions item, select the Run Script Addition. The File option should be highlighted. Locate the BLUEBOX.TXT file, select it, and then click on the OK button. PageMaker will define the colors listed in the script, apply them to the object, generate a duplicate object with a drop-

```
--This section of the script creates a 3-column grid

pageoptions off, off      --set up single sided, single pages
pagesize 8.5i, 11i        --sets letter size page
pagemargins 4p, 4p, 4p, 4p --margins set to 4 picas for all four sides
measureunits picas, custom, 12 --sets picas as the default unit of measure and
                                --custom vertical ruler is set to 12 points

snaprulers on            --turns on snap to ruler function
zerolock off              --turns off zero point lock
zeropointreset            --resets zero point to default position
guides on                 --displays guides
insertpages 1, after      --inserts new page after current page
page rm                   --go to right master page
deleterulerguides         --removes all guides on current page
columnguides 3,1          --creates 3 column grid with 1 pica gutter
                                --for master page
page prev                 -- returns to previous page
lockguides                -- locks guides in place

--This section of the script creates a 4-column grid

pageoptions off, off      --set up single sided, single pages
pagesize 8.5i, 11i        --sets letter size page
pagemargins 4p, 4p, 4p, 4p --margins set to 4 picas for all four sides
measureunits picas, custom, 12 --sets picas as the default unit of measure
                                --and custom vertical ruler is set to 12 points

snaprulers on            --turns on snap to ruler function
zerolock off              --turns off zero point lock
zeropointreset            --resets zero point to default position
guides on                 --displays guides
insertpages 1, after      --inserts new page after current page
page rm                   --go to right master page
deleterulerguides         --removes all guides on current page
columnguides 4, 1         --creates 3 column grid with 1 pica gutter
                                --for master page
page prev                 -- returns to previous page
lockguides                -- locks guides in place

--This section of the script creates a custom grid with 4 horizontal rows

pageoptions off, off      --set up single sided, single pages
pagesize 8.5i, 11i        --sets letter size page
pagemargins 4p, 4p, 4p, 4p --margins set to 4 picas for all four sides
measureunits picas, custom, 12 --sets picas as the default unit of measure and
                                --custom vertical ruler is set to 12 points

snaprulers on            --turns on snap to ruler function
zerolock off              --turns off zero point lock
zeropointreset            --resets zero point to default position
guides on                 --displays guides
insertpages 1, after      --inserts new page after current page
page rm                   --go to right master page
deleterulerguides         --removes all guides on current page
columnguides 3, 1         --creates 3 column grid with 1 pica gutter
                                --for master page
movecolumn 1, right, 21p7.5 --widens column 1 by 4 picas
movecolumn 2, right, 34p4  --widens column 2 by 2 picas

guidehoriz 18p            --creates horizontal guide for bottom of row 1
guidehoriz 18p8           --creates horizontal guide for gutter between rows 1&2
guidehoriz 32p8           --creates horizontal guide for bottom of row 2
guidehoriz 33p4           --creates horizontal guide for gutter between rows 2&3
guidehoriz 47p4           --creates horizontal guide for bottom of row 3
guidehoriz 48p            --creates horizontal guide for gutter between rows 3&4

page prev -- returns to previous page
lockguides -- locks guides in place
```



Figure 1: The GRIDS.TXT script allows you to switch quickly between different page guides. Using PageMaker's Text tool, highlight the portion of the script you want to run. Then invoke the Run Script command, making sure to check the Selection option.


```
--Defines a new light blue color
definecolor "Bluebox", process, cmyk, false, 15,10,0,10
--Defines a new dark red color
definecolor "Redline", process, cmyk, false, 10,80,60,10
--Defines a new gray color
definecolor "Shadow", process, cmyk, false, 0,0,0,30
--Assigns colors to selected object
fillandline (2, "Bluebox", off) (twopoint, off, , , "Redline", on)
--Copies selected object to clipboard
copy
--Pastes, offsets copy, copy is selected
multiplepaste 1, .25i, .25i
--Assigns solid fill to selected object
fillstyle 2
--Assigns gray color to selected object
color "Shadow"
--Assigns no line to selected object
linestyle none
--Sends drop shadow to back
sendtoback
```



Figure 2: The BLUEBOX.TXT script formats the selected object with a light-blue fill, a red outline, and a gray drop shadow.

shadow color, and offset the duplicate by 0.25 inches down and to the right, as shown in Figure 5.

PUSH-BUTTON CONTRIBUTIONS Complex documents, like the magazine you're reading, have always been authored by a number of different contributors. Workgroup publishing puts a new spin on this old phenomenon by allowing authors to bypass an editor and make their contributions to the final publication directly.

Allowing the various members of a workgroup unlimited access to a publication—or to PageMaker itself—can be a nightmare for a network manager, because he or she must support users who may have no graphic arts training. So, instead of plunging novice users into the unknown waters of typography, story flow, and page layout, you can choose to have them drive PageMaker from the applications they know best, provided that those applications support Dynamic Data Exchange (DDE).

The sample script TABLE1.XLS is an Excel 5.0 macro that takes advantage of DDE. It allows an Excel user with no design expertise to contribute a table to a PageMaker document. The user creates the table in Excel, formats the table in Excel, and selects the range of cells in Excel. With the cells highlighted, the user invokes a macro that copies the table to the Clipboard, opens up a DDE channel to PageMaker, creates a new three-page PageMaker document, Paste Links the table, and positions the table at the bottom of page 3.

To employ the macro you must first make sure that PageMaker is open on your desktop. In Excel, highlight the range of cells you want to export to PageMaker. You could invoke the macro by issuing the Tools | Macro command and selecting the macro titled "NewPM5Pub". But there is an even easier way to actuate it: Simply click the button with the PageMaker icon that is embedded in the worksheet (see Figure 6). The button was cre-

```
'Macro NewPM5Pub
'Copies the currently selected cells to the Windows clipboard
'Creates a new document in PageMaker 5.0
'Creates a new typestyle called Table1
'Pastelinks the contents of the clipboard
'Moves the object to the bottom of the page
'Assigns text wrap attribute to object

Sub NewPM5Pub()
    Selection.Copy
    Table1 = Application.DDEInitiate("PageMaker", "")
    Application.DDEExecute Table1, "new 3;page xm;columnguides
    3,1p;page 3;pastelink;move leftbottom 1i 10.25i;textwrap rect,
    columnbreak, 0,.2i,0,0"
    Application.DDETerminate Table1
End Sub
```



Figure 3: TABLE1.XLS is an external script you can use to import and position data in PageMaker 5.0.

ated using the Tools | Assign Macro command to associate the macro with an imported picture.

MODIFYING THE SCRIPTS GRIDS.TXT, BLUEBOX.TXT, and TABLE1.XLS, are generalized scripts that have been designed to run on the broadest number of systems without modification. Consider BLUEBOX.TXT (Figure 2), for example. Its first three lines define new colors. These commands are included because that is the only way to guaran-

tee that the necessary colors will be available for use with the subsequent fillandline command. If you are using BLUEBOX.TXT (or a similar script) in conjunction with a template that already contains the appropriate color definitions, you can omit these statements. Likewise, all three of the scripts have avoided the issues of filenames and path statements, which will obviously change from system to system.

You can streamline and supercharge these scripts by modifying them for your particular needs and your particular production environment. You can change the number and position of horizontal guidelines in GRIDS.TXT (Figure 1) to create any number of different catalog layouts. You can alter the fill and line colors in BLUEBOX.TXT. You can even modify the DDE commands in the Excel 5.0 macro (Figure 3) to work from within other application programs.

Before you try to modify any of these scripts, however, you must understand a few basic rules and concepts about the scripting process. Detailing all the syntax and structuring conventions of PageMaker's scripting language is beyond the scope of this article. Refer instead to the

Script Language Guide for a thorough explanation of each command and its parameters.

PageMaker's scripting language is so straightforward that in many cases you'll recognize a command from its menu equivalent. For example, to set up a page grid you'd use either the Column Guides menu command or the columnguides scripting command. There are cases, however, in which the script-based commands are not identical to PageMaker's func-

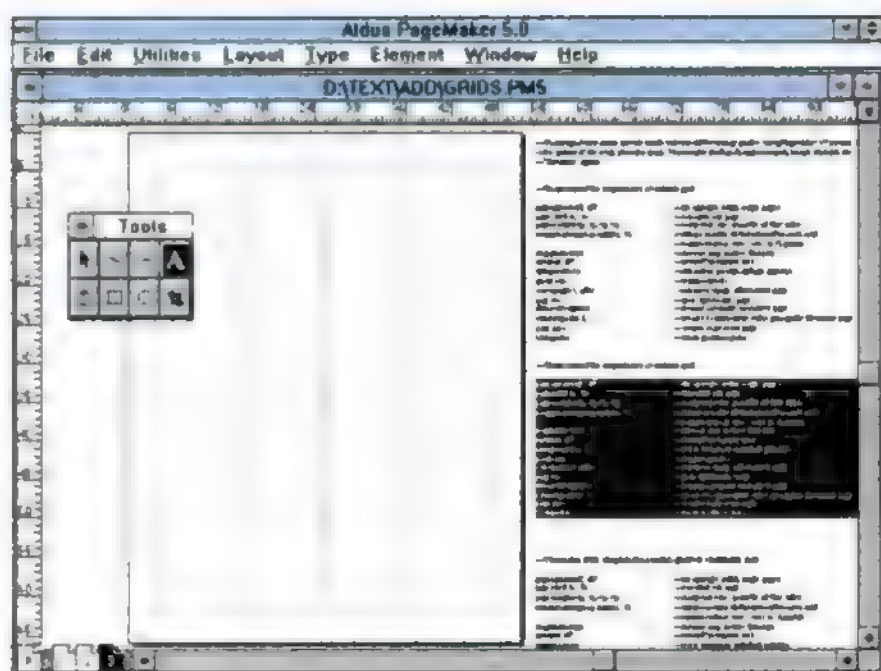


Figure 4: After placing a PageMaker script on the pasteboard, you can highlight and run only a portion of the script.

tions. Operations that are normally carried out with the mouse, such as selecting or moving an object, require a special set of commands. Similarly, dialog boxes that contain a large number of options, such as the Print dialog box, are often split into a series of scripting commands.

Commands always appear as a single word, such as `columnguides` or `insertpages`. Command parameters always appear in a specific order. So the `insertpages` command is always followed by the number of pages to insert and the location for the new pages in relation to the currently displayed page (before, after, or between). You'll find scripts much easier to edit if you take the time to make the script itself clear. Make liberal use of comments (preceded by a double hyphen) to describe the effect of each command. Use descriptive word parameters (such as `move topleft, 1, 2`) instead of arbitrary numerical equivalents (such as `move 5, 1, 2`).

Finally, take advantage of formatting and separating characters (commas, spaces, tabs, and parentheses) to make internal scripts more legible. From PageMaker's point of view, there is no difference between

```
fillandline 2 "Bluebox" off
twopoint off, , , "Redline" on
--Assigns colors to selected object
```

and

```
fillandline (2, "Bluebox", off)
(twopoint, off, , , "Redline", on)
--Assigns colors to selected object
```

From a user's point of view, however, the second version of the `fillandline` command is much more understandable, because the parentheses clearly identify the first set of values as the fill parameters and the second set of values as the line parameters.

RELATIVE VS. ABSOLUTE VALUES The `GRIDS.TXT` script is particularly easy to edit because you can use PageMaker's text tool to highlight a parameter and change it—right there on the pasteboard. If you wanted to insert five contiguous

pages instead of a single page, for example, you would simply find the `insertpages` command and replace the parameter value of 1 with a 5, as follows:

```
--inserts 5 pages after current page
insertpages 5, after
```

If you make this one change, then highlight and run the script, you'll find yourself returned to the last of the five pages you just inserted. That's because the command that returns you from the Master page to your document uses a relative parameter instead of an absolute value. In this case, the relative value is the parameter for the previous page (`prev`). Using the `prev` parameter means that you don't have to worry about entering a specific page number when you run the script. Having changed the script to insert five pages instead of one requires you to consider changing this relative value to an absolute value, however. Assume for a moment that you have just finished working on page 3 of a document. You want to add five pages to the publication, but—quite logically—you want page 4 to be the next page displayed on your screen. You'd simply change the `prev` to a specific page number:

```
page 4 --returns to page 4
of document
```

Be warned: Once you've used an absolute parameter, like 4, you'll be returned to page 4

whenever you run the script or until you specifically change the parameter.

CONTROLLING THE ENVIRONMENT As you edit these sample scripts or begin to write your own, you need to take environmental factors (such as Preferences settings and the default measurement system) into consideration. Each subsection of `GRIDS.TXT`, for example, goes to the trouble of resetting things like the page size, the unit of measurement, and the zero point. This isn't pedantic attention to detail: It's absolutely necessary, because commands within the script are dependent upon these factors and won't work consistently if the environment isn't stable. Look at the key commands that create the custom column/grid layout (the `movecolumn` and `guidehoriz` commands that appear toward the end of Figure 1). Not one of these commands will work properly if the zero point has been moved. Always including a specific command to return the zero point to its default location is an insurance policy that guarantees the script will run successfully.

FLEXIBLE SCRIPTS, FLEXIBLE LAYOUTS If you take the time to plan your scripts carefully you'll find that they can be transported between documents and used over and over again. `BLUEBOX.TXT` could have been hard-coded to create a box of a particular size (by drawing the rectangle via scripting commands) in a specific location on the page (by specifying absolute *x,y*-coordinates). But doing so would have limited its utility. It would have become a script that could create only one type of box, such as a ½-

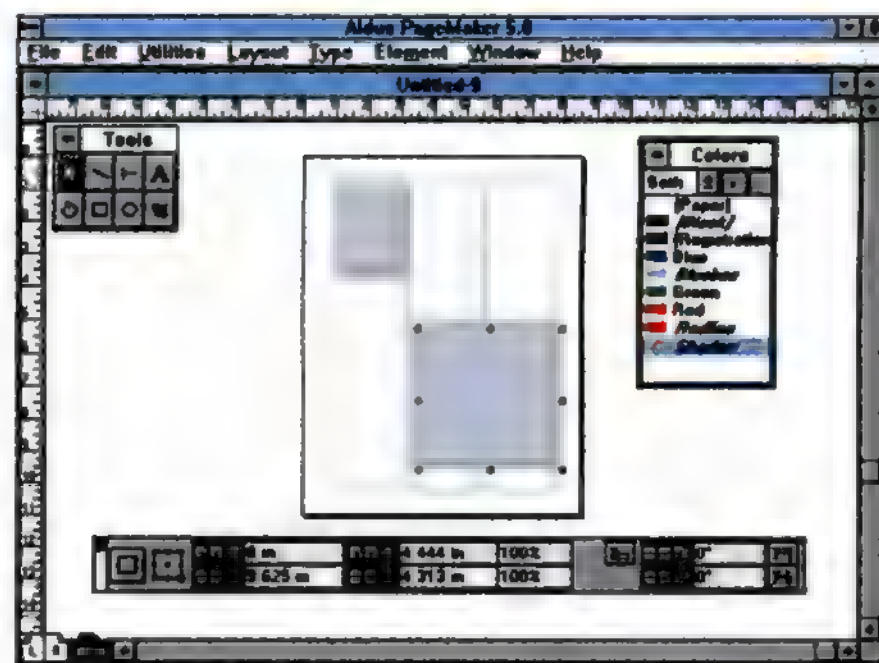


Figure 5: `BLUEBOX.TXT` formats any size box drawn with PageMaker's rectangle tool, giving it a blue fill and red outline. The drop shadow itself is created, formatted, and positioned entirely by commands contained in the script.

page box and drop shadow but not a 2/3-page box and drop shadow.

Two factors make BLUEBOX.TXT usable for any box of any size located anywhere on the page. First, the script does not generate the box—the user draws it. Second, BLUEBOX.TXT does not use an explicit command, such as move, that requires absolute coordinates. Instead, the script employs an alternative command—multiplepaste—that offers much more flexibility. In this case, multiplepaste allows you to specify how many copies you want to paste into the document (one is a perfectly acceptable number) as well as the offset position of the copy. Offsetting the copy from the currently selected object ensures that the drop shadow will always appear in the correct location without having to specify any x,y-coordinates whatsoever.

It's equally important to build flexibility into the design of your documents. This is especially important in a multiauthor environment or in an environment in which the elements of a design may change size and shape from project to project. For instance, the script in TABLE1.XLS specifies that the table be moved by the left-bottom handle.

```
move leftbottom 11 10.251
```

This line represents both a scripting decision and a design decision. It allows the table to vary in height from project to project while maintaining visual consistency.

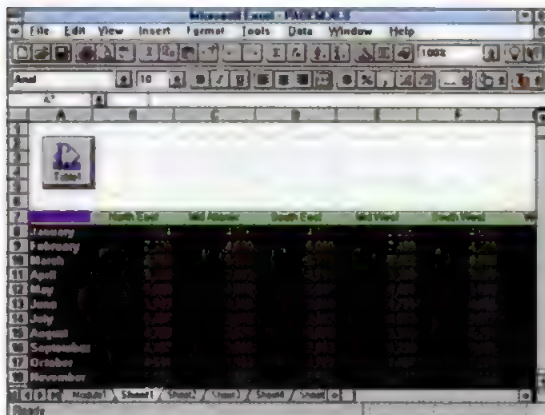


Figure 6: Clicking the button embedded in this worksheet launches a DDE link to PageMaker.

No matter how tall or short the table becomes, it will always be placed flush against the bottom margin of the page (see Figure 7). This flexibility could not have been achieved by moving the table by its center or top handles, for that would require knowing the depth of the table before it could be properly positioned. This flexibility would likewise be impossible if the layout called for graphics to be floated in the center of the page.

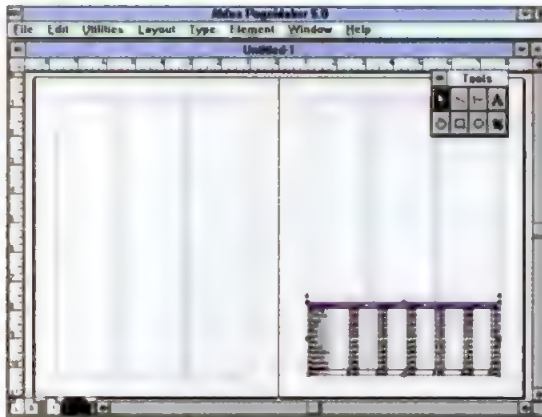


Figure 7: This is how the table appears in PageMaker.

Note that TABLE1.XLS also assigns a text-wrap attribute to the table. This is exactly the sort of detail that might escape a beginning PageMaker user, and it is a good illustration of how well-designed scripts can shield novices from the details of desktop publishing. This command also reflects a sensible and flexible design. By assigning a text-wrap attribute, the script guarantees that when text is imported into the layout it will not conflict with the table but will instead wrap around it.

There are limitations to PageMaker's scripting language. You can't add new functions to PageMaker; you can only automate functions that already exist within the product. Using that automation capacity wisely, however, can save you countless hours of work. And using that automation in conjunction with Dynamic Data Exchange can create a working environment in which content drives the design process. □

LUISA SIMONE IS A CONTRIBUTING EDITOR OF PC MAGAZINE.

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Toolkits

BY RICK KNOBLAUGH

Write VxDs With VToolsD

To manage hardware devices, emulate hardware, or perform other low-level, ring 0-privileged operations under Windows, you must write a VxD (virtual device driver). Traditionally, the only language you could use for developing VxDs has been assembly language.

Vireo Software's VToolsD (\$495) lets you develop VxDs in 32-bit C/C++. It provides a specialized version of the C runtime library, C language wrappers for accessing the hundreds of VMM (virtual machine manager) services called on by VxDs, and C++ class libraries that abstract these services. In addition, VToolsD provides utilities that relieve you of grunt work and get you started quickly.

Full library source code is included along with sample programs, comprehensive on-line help, and outstanding documentation. The chapter "Understanding VxDs" contains a wealth of knowledge about VxD programming.

Installing VToolsD is easy, particularly if you already have a C compiler, the Windows 3.1 DDK (Device Driver Kit), and a debugger present on your system. The setup program detects the location of these tools and places the paths into a configuration file it later uses when generating NMAKE files.

To jump-start your development efforts further, the supplied QuickVxD utility automatically generates an include file, make file, and skeleton code module for a new VxD. Clicking on the QuickVxD icon brings up a form-based utility that lets you select C or C++ frameworks, appropriate debug symbol files, and retail or debug object libraries. You can also enter DDB (device descriptor block) values

(the VMM will use this information for initializing the virtual device and sending messages to it), and select control messages (such as `DEVICE_INIT`, `SYS_CRITICAL_INIT`, and so on) for which QuickVxD generates skeleton handlers.

The VToolsD C language framework streamlines the task of establishing device descriptor blocks and event handlers. For a register-based interface to VMM services (versus C's stack-based approach), VToolsD provides C language wrappers that load registers from function arguments and generate the appropriate calls. For cases where the VMM makes callbacks to your code, *thunks* (intermediary entry points) supply the translation.

The VToolsD class libraries encapsulate the underlying interface, resulting in less implementation burden and better code organization. Operations that are commonly used together to accomplish a task are housed together in C++ classes. For example, the `VHardwareInt` class for

handling a hardware interrupt includes member functions for hooking/unhooking the IRQ, masking/unmasking the IRQ, asserting/deasserting the IRQ, issuing the EOI (end of interrupt), and more.

VToolsD supports both the standard methods for debugging VxDs: Microsoft's WDEB386 (part of the DDK) and Nu-Mega Technologies' Soft-ICE/W. VToolsD generates NMAKE file statements to launch the appropriate symbol-file-generation utility. Since WDEB386 isn't as full-featured as Nu-Mega's Soft-ICE/W, you will probably want to use Soft-ICE/W with VToolsD. Nu-Mega Technologies offers a software bundle of Vireo's VToolsD and Soft-ICE/W 1.5 for \$699.

VToolsD, Version 1.02, supports Microsoft's Visual C++, Version 1.0 (32-bit edition). A Windows 95 version is also available. Upgrades that support Borland's BC 4.x and Microsoft's Visual C++, Version 2.0, will be available by the time this review appears in print.

VxDs are the essential vehicle for low-level Windows access—and the development process can be rigorous. You'll want all the available advantages. VToolsD is one of them.

► **VToolsD, Version 1.02.** List price: \$495. Requires: 386-based PC or better, 4MB hard disk space, Microsoft Visual C++ 1.0 (32-bit edition) or later, Microsoft Windows 3.1 DDK or VxD-Lite. Vireo Software Inc., 385 Long Hill Rd., Bolton, MA 01740; 508-779-8352.

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OFF THE STACK

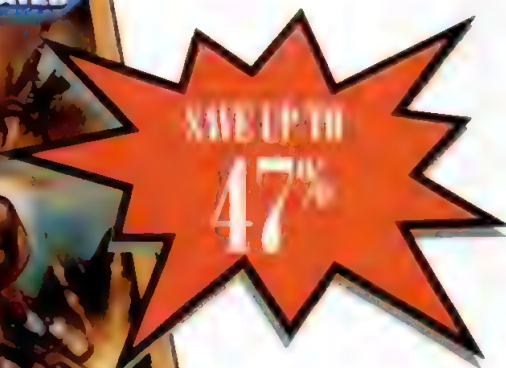
● **American Cybernetics** has released a Windows version of its flexible programmers' editor, Multi-Edit. Multi-Edit for Windows (\$199) can be used as an integrated development environment (IDE), allowing you to access compilers, linkers, and makers without leaving the editor. You can even tap into your compiler's on-line help from within Multi-Edit. The powerful built-in macro language supports structures, arrays, and DLL importation. *American Cybernetics; 602-968-1945; fax, 602-966-1654.*

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● **Nu-Mega** has begun shipping a Windows NT version of its unique debugging tool, Bounds-Checker. Bounds-Checker32/NT, Version 1.0 (\$249), detects common Windows NT programming problems such as multi-threading bugs, API-compliance errors, invalid API parameters, and API failures. It can also detect invalid memory accesses and memory and resource leaks. The package includes TVIEW, which is an event logger that lets you track the flow of events leading up to an error. *Nu-Mega Technologies Inc.; 603-889-2386; fax, 603-889-1135.*

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Power Programming

BY RAY DUNCAN

Publishing a Database with WinHelp

In my last two installments of this column, I've discussed the use of the WinHelp and Microsoft Multimedia compilers and viewers as a medium for electronic publishing. A recent comment by one of the *PC Magazine* staff made me realize that perhaps I've taken too much for granted in these discussions. The staffer asked, in effect, "If you want to publish something electronically, why not just distribute the document as a Microsoft Word file rather than going to all that trouble to convert it to a WinHelp file?" To answer this question, let's review some of the basic issues involved with traditional book publishing and then consider how they relate to electronic publishing.

The printed volumes that you find in your corner bookstore are the end products of a complex, far-flung industry whose methods, structure, terminology, and traditions date back hundreds of years. (If you are ever in any doubt about the magnitude, power, and wealth of the publishing industry, I suggest a little field trip to the yearly convention of the American Bookseller's Association or a jaunt to the world-famous Frankfurt Book Fair.) The publishing industry embraces hundreds of manufacturing steps, job descriptions, crafts, and exotic specialties, ranging from logging to typography to cutthroat marketing, but it all has a single goal: the creation, manufacture, and distribution at a healthy profit of a familiar artifact with some very well-defined characteristics:

- **Familiarity and usability:** The overall structure of a book is highly standardized,

both in physical layout (binding on the left in Western cultures, pages of uniform size, and so on) and in organization (title page, verso, table of contents, preface, introduction, body, index). Publishers and buyers alike accept and expect this standardization: it makes books easier to sell and easier to use.

- **Suitability to mass production and distribution:** Book designs have evolved in parallel with typesetting systems, printing presses, shipping methods, the sizes of display shelves in bookstores, and many other influences. If a book is designed outside of the limits imposed by these related technologies, its manufacturing and distribution costs increase dramatically and its potential audience shrinks.

- **Flexibility:** Within the rather strict constraints of familiarity, usability, and suitability to mass production and distribution, a book can vary in appearance, style, and content in an unimaginable number of ways, much as a poet can express any conceivable concept or sentiment within the highly formalized, tightly constrained structure of haiku or a sonnet.
- **Beauty:** A carefully written, illustrated, edited, designed, and printed book is an elegant object with appeal on many levels:

tactile (cover materials, paper texture, "heft"), visual (cover design, paper color, typefaces, page layout), and intellectual (development of arguments, novelty of plot, creative use of language, and so on). Even the smell of a book is important!

- **Random access:** A book is more like a magnetic disk than a magnetic tape, in that every page is equally available at all times. You can stop reading it at any point and pick it up at that same point later with a minimum of difficulty. Moreover, if you want to navigate directly to an arbitrary piece of information, there are widespread organizational conventions (like the table of contents and index), found at predictable locations within a volume, that can be relied upon to assist you.

- **Integrity and credibility:** A book is distributed as a coherent unit that is very nearly tamper-proof. The binding, the uniform appearance of pages, the regular progression of page numbers, the consistency between the table of contents, the index, and the body of the book, the voice and style of the author (which will shine through almost any amount of editing)—all of these aspects of a book (and many

Structuring a WinHelp-Enhanced Database

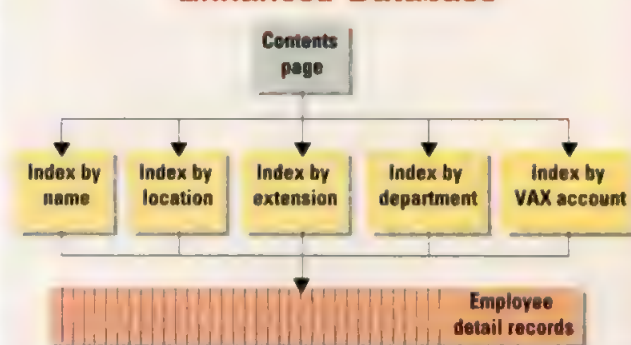


Figure 1: This was the planned structure for the WinHelp version of an employee database.

others) support the assumption that what we are seeing is exactly what the author and publisher intended us to see.

- **Self-sufficiency:** A book is self-contained, portable, and unencumbered. When you buy a book, you have everything you need to make use of it, and you can use it where and when you please. Your hands, eyes, and brain are the only peripherals necessary—no additional purchase required!

Undoubtedly I've failed to enumerate other characteristics of a book (mostly financial) that a real publisher would consider crucial, but the list above should suffice for the moment. Now let's see how the considerations I've mentioned apply to electronic publishing with the WinHelp compiler and viewer, or with its big brother, Microsoft Multimedia Publishing Toolkit:

- **Familiarity and usability:** The basic commands and capabilities of the viewer are familiar to anyone who has used Microsoft Windows for more than an hour, since the on-line references for Windows itself and all Windows-based application programs are presented via the same viewer. Furthermore, the viewer relies on standard Windows user-interface objects (windows, menus, and dialogs) supplemented by its own unique navigation aids (hotlinks).

Implementation Strategy for Converting a Database to WinHelp

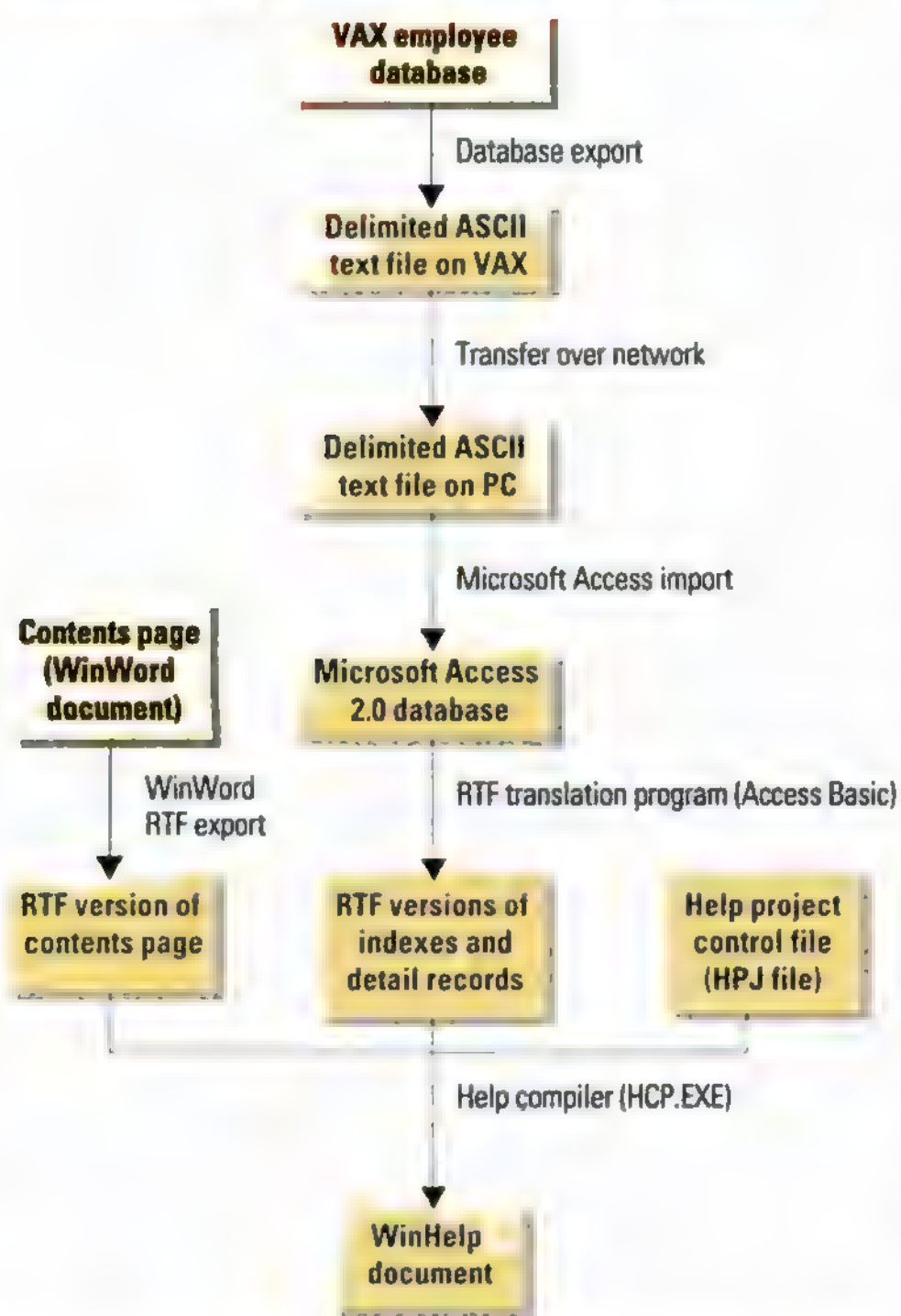


Figure 2: This shows the data migration and implementation strategy for the WinHelp version of the employee database.

- **Suitability to mass production and distribution:** An author can build a WinHelp or Multimedia Viewer document from many different text files, icons, bitmaps, video clips, and sound bites, but the final result is a single monolithic file. Distributing a single electronic document (albeit a large one) eliminates the danger of losing or damaging individual components.
- **Flexibility:** As with a printed book, there is ample latitude for novelty and creativity within the limitations of the medium and the time-tested conventions for document organization.
- **Beauty:** The resolution of the display device (whether video screen or laser printer) for the WinHelp or Multimedia Viewer is unfortunately far inferior to that of the printed page. Nevertheless, good design and proper use of graphics and typefaces can still produce an esthetically pleasing electronic document.

- **Random access:** If the author makes appropriate use of the viewer's facilities for hotlinks and keywords, navigation to any section of an electronic document is straightforward. Bookmarks and annotations added by end users are also supported. Multimedia Viewer adds a full-text search capability over and above the keywords and indexing explicitly provided by the document's author.

- **Integrity and credibility:** The monolithic nature of a WinHelp or Multimedia Viewer document file, together with the proprietary internal format, the complex interdependencies between its elements, and the optional use of compression, all work together to make the

document relatively tamper-proof. Of course, nothing binary is ever going to be completely immune to alteration, but manipulation of the content would require an investment of effort and technical expertise far beyond the resources of the average user and completely out of proportion to any potential rewards.

- **Self-sufficiency:** The WinHelp viewer is a standard part of the Windows package, which (these days) is preinstalled on virtually every new PC. The Macintosh version of the WinHelp viewer is widely available as well, since it is bundled in the pervasive Macintosh versions of Microsoft's Word, Excel, and PowerPoint. Thus, essentially anyone who obtains a WinHelp document is going to have access to a system that will allow them to view or print it. Documents built with Multimedia Toolkit are somewhat less universally accessible, because not all readers' systems will have Multimedia Viewer and no Macintosh version of the Viewer is currently available. However, Microsoft does allow you to distribute the Windows version of the Multimedia Viewer program and its supporting DLLs along with your electronic document without any additional royalty or license fee.

Now let's get back to the *PC Magazine* staffer's suggestion that we publish things electronically by distributing WinWord documents. WinWord is a fine word processing program, but as a platform for electronic publishing it leaves a great deal to be desired. Its greatest flaws as a potential electronic publisher lie in the areas of random access, integrity and credibility, and self-sufficiency. The full-text search facility in WinWord is relatively slow, and there is no efficient support for hyperlinks or keyword indexing; a WinWord document can be altered by anyone (a reader could never be sure that he was viewing the original); and a WinWord document incurs the additional cost and disk-space overhead of the Word for Windows program.

Nothing I have said should be construed to mean that I am recommending WinHelp or Multimedia Publishing Toolkit as the best solution for electronic publishing. I've used WinHelp and Multimedia Publishing Toolkit for this series of columns because the tools are readily available, are either free (WinHelp) or relatively inexpensive (Multimedia Pub-

Option Compare Database 'Use database order for string comparisons
Option Explicit

Sub EmitRTFFootnote (FileNum As Integer, FootnoteChar As String,
FootnoteBody As String)

' Routine to emit an RTF footnote record.
' Assumes output file has been previously opened as #FileNum.
' Superscripting of FootnoteChar is not really necessary
' but looks nicer if RTF file is read into WinWord later.

Print #FileNum, FootnoteChar + "{\footnote ";
Print #FileNum, "{\fs16\up6 " + FootnoteChar + " }";
Print #FileNum, FootnoteBody + "}"

End Sub

Sub EmitRTFHeader (FileNum As Integer)

' Generate RTF file header using passed file number
' Assumes that the file has been previously opened successfully

' First emit RTF file identifier, default character set, etc.
Print #FileNum, "{\rtf1\ansi \def\deflangl024"

' Generate a minimal font table containing just enough
' fonts to support Windows and Macintosh viewing

Print #FileNum, "{\fonttbl"
Print #FileNum, "{\f0\froman Times New Roman;}"
Print #FileNum, "{\f1\froman Symbol;}"
Print #FileNum, "{\f2\swiss Arial;}"
Print #FileNum, "{\f3\swiss Helvetica;}"
Print #FileNum, "{\f4\swiss Hel;}"
Print #FileNum, "}"

' Generate a minimal color table consisting of black,
' blue, green, red, and white.

Print #FileNum, "{\colortbl;"
Print #FileNum, "\red0\green0\blue0;"
Print #FileNum, "\red0\green0\blue255;"
Print #FileNum, "\red0\green255\blue0;"
Print #FileNum, "\red255\green0\blue0;"
Print #FileNum, "\red255\green255\blue255;"
Print #FileNum, "\red0\green127\blue0;"
Print #FileNum, "}"

' Set the default font to Times New Roman
Print #FileNum, "\def\0"

' Generate an initial topic separator
Print #FileNum, "\page"

End Sub

Sub EmitRTFHotLink (FileNum As Integer, HotLinkString As String,
TargetString As String)

' Routine to emit RTF hotlink to the specified file.
' The RTF encoding for a hotlink is double-underlined text
' followed by hidden text. The double-underlined text is the
' visible portion of the hotlink to be clicked on by the user.
' The hidden text is the "context string" for the target topic.
' Note: Prefixing the hidden text with "%" suppresses visible
' underlining of the hotlink. We assume that the color of the
' text will be set to something other than black elsewhere.

Print #FileNum, "{\uldb " & HotLinkString & "}{\v % " & TargetString
& "}"

End Sub

Sub EmitRTFTabStopInches (FileNum As Integer, TabStop As Variant)

' Called with tab stop in fractional or integer inches.
' Converts inches to Twips and calls EmitRTFTabStopTwips to
' generate the RTF command.

Call EmitRTFTabStopTwips(FileNum, Int(TabStop * 1440))

End Sub

Sub EmitRTFTabStopTwips (FileNum As Integer, TabStop As Integer)

' Generates the RTF command to set a tab stop.
' The RTF \tx command parameter and thus the TabStop parameter for
' this subroutine is given in twips. 1440 twips = one inch.

Dim Str1 As String

Str1 = "\tx" & LTrim\$(Str\$(TabStop)) & " "
Print #FileNum, Str1

End Sub

Sub EmitRTFTopicDivider (FileNum As Integer, TopicTitle As String,
ContextString As String, KeywordString As String,
TitleFootnote As String, BrowseSequence As String)

' This routine emits the RTF code to begin a new "topic".
' The code consists of a "page break" command followed by
' footnotes for the topic's context string, title footnote
' for history list, keyword list, and browse sequence, followed
' by the topic heading which appears in a nonscrolling region
' in 14 pt. type. The default paragraph formatting and font are
' then restored.

' signal start of new viewer topic
Print #FileNum, "\page"

' write context string footnote as label for this topic
Call EmitRTFFootnote(FileNum, "%", ContextString)

' write title footnote to be used in history window
' and (for multimedia viewer) in search dialogs
Call EmitRTFFootnote(FileNum, "\$", TitleFootnote)

' write keyword footnote iff keyword string was supplied
If KeywordString <> "" Then

' write keyword string footnote for use with Search button
Call EmitRTFFootnote(FileNum, "K", KeywordString)

End If

' write browse sequence footnote iff browse sequence was supplied
If BrowseSequence <> "" Then

' write browse sequence number footnote
Call EmitRTFFootnote(FileNum, "+", BrowseSequence)

End If

' Write the topic header text, using the "keep with next"
' attribute to put the header in a nonscrolling window
Print #FileNum, "\keepn \f2\fs28 ";
Print #FileNum, TopicTitle
Print #FileNum, "\par "

' Restore default paragraph formatting and font.
' The (dtype) command is needed for the multimedia compiler's
' full-text indexing, but does no harm if the WinHelp
' compiler is used instead.
Print #FileNum, "\pard \f2\fs28 {\dtype}"

End Sub

Sub EmitRTFTrailer (FileNum As Integer)

' Routine to generate RTF file trailer.
' Just emits RTF codes to close out the current
' paragraph if any and then close out the current
' topic, following all with a closing brace to
' balance the initial brace written by the
' EmitRTFHeader routine.

Print #FileNum, "\par"
Print #FileNum, "\page"
Print #FileNum, "}"

End Sub

Figure 3: These RTF generator routines were used to build the WinHelp version of the employee database.



lishing Toolkit), and the electronic documents and their viewers are unencumbered by royalties or license fees. But there are a great many other options for an aspiring electronic publisher, ranging from file-based solutions such as Adobe Acrobat or No Hands Software's Common Ground to sophisticated multimedia authoring systems to network-based solutions such as the World-Wide Web and its client software (Mosaic and the rest). If you embark on an electronic publishing project, you might start out with WinHelp for prototyping, but you owe it to yourself to investigate all the options before your final implementation.

DATABASES AND WINHELP In my most recent Power Programming column (February 7, 1994), I explained how I used a custom RTF translator program and the WinHelp compiler and viewer to automate the electronic publishing of a very large medical genetics reference book (Mendelian Inheritance in Man). In that same column I alluded to the use of WinHelp for the electronic publishing of highly structured data, for example the contents of a flat file or relational database. In this installment, I'll show you exactly how that can be done.

But first, let me address your unspoken questions. Why, you might be wondering,

would anyone in their right mind want to convert a database into a WinHelp document? After all, the dBASE file format is a universal—if somewhat clumsy—common denominator. If you distribute a database as a dBASE file, it can be accessed by nearly every commercial database program in existence, on nearly every computing platform or operating system that you might care to think of. Well, for electronic publishing, dBASE files have the same inherent flaws that Microsoft Word files have:

- It's difficult to distribute a native database file in a way that makes it immune to tampering or even inadvertent changes as

```
Rem CSMC Employee Directory RTF File Generator
Rem Copyright (C) 1994-95 Ray Duncan
Rem Version 1.0 12/1/94 derived from OMIM.MDB and GENEMAP.MDB
```

```
Option Compare Database ' use database order for string comparisons
Option Explicit ' force declaration of all variables
```

```
Function Main ()
```

```
    ' This is the main routine of the conversion program; it can be
    ' invoked with a command button or by running a macro. It generates
    ' several different sorted indexes of employee names, then generates
    ' a main file containing the detailed information about each employee.
```

```
    Call WriteIndexFile("CSMC Directory by Employee Name", "idx_name",
    "idxname.rtf", "EntireName", "LastName", 1.5)
    Call WriteIndexFile("CSMC Directory by VAX Account", "idx_vax",
    "idxvax.rtf", "VaxMail1", "VaxMail1", 1.25)
    Call WriteIndexFile("CSMC Directory by Extension", "idx_ext",
    "idxext.rtf", "Extension", "Extension", 1.5)
    Call WriteIndexFile("CSMC Directory by Location", "idx_locn",
    "idxlocn.rtf", "Location", "Location", 1.5)
    Call WriteIndexFile("CSMC Directory by Department", "idx_dept",
    "idxdept.rtf", "Dept", "Department", 3)
    Call WriteBodyFile("cmcdir.rtf", "EntireName")
```

```
End Function
```

```
Function Mcase (Sarg As Variant) As Variant
```

```
    ' Converts the argument string to mixed case if and only
    ' if the string is in all caps. We use the "variant" form
    ' of the string functions so that the routine won't crash
    ' if it is passed a "null" string (as opposed to a
    ' zero-length string).
```

```
    If StrComp(Sarg, UCase(Sarg), 0) <> 0 Then
        Mcase = Sarg
    Else
        Mcase = UCase(Left(Sarg, 1)) & LCase(Mid(Sarg, 2))
    End If
```

```
End Function
```

```
Sub WriteBlankLine (FileNum As Integer)
```

```
    ' Generates the RTF code for a blank line. For
    ' simplicity, this is just implemented as generation
    ' of an empty paragraph.
```

```
    Print #FileNum, "\par"
```

```
End Sub
```

```
Sub WriteBodyFile (FileName As String, IndexField As String)
```

```
    ' This routine builds the main RTF file for the employee
    ' database. Each employee record in the database is converted
    ' to an individual topic in the output file. The context
    ' string and browse index for each topic is a function
    ' of the number of the corresponding record in the database.
    ' The employee last name is used for the keyword footnote.
    ' The full employee name, with the last name first, is used
    ' for the topic heading and for the title footnote (needed
    ' for the history window).
```

```
Dim Dbase As Database, Dset1 As Recordset
Dim TopicTitle As String, ContextString As String
Dim BrowseSequence As String, KeywordString As String
```

```
    ' open database and employee info table, set sort order
    Set Dbase = DBEngine.Workspaces(0).Databases(0)
    Set Dset1 = Dbase.OpenRecordset("CSMC Directory", DB_OPEN_TABLE)
    Dset1.Index = IndexField
```

```
    ' open RTF output file, truncating any previous file
    ' by the same name to zero length
    Open FileName For Output As #1 Len = 4096
```

```
    ' write RTF file identifier, font table, and color table
    Call EmitRTFHeader(1)
```

```
    ' now walk through the sorted recordset and write the detail records
    While Dset1.EOF <> True
```

```
        ' Build topic title, browse sequence number, context string, and
        ' keyword string. Note: browse sequence & context string are
        ' synthesized from a counter field.
        TopicTitle = (Mcase(Dset1![LastName]) & ", " &
        Mcase(Dset1![FirstName]))
        BrowseSequence = "dir:" & Left$("00000", 6 - Len(Str$(Dset1![ID])))
        & LTrim$(Str$(Dset1![ID]))
        ContextString = "dir_" & LTrim$(Str$(Dset1![ID]))
        KeywordString = Mcase(Dset1![LastName])
```

```
        ' write index topic header, but omit browse sequence number for
        ' index topics
        Call EmitRTFTopicDivider(1, TopicTitle, ContextString,
        KeywordString, TopicTitle, BrowseSequence)
```

```
        ' set tab stop at 1"
        Call EmitRTFTabStopInches(1, 1)
```

```
        ' turn off line wrap for index entries
        Print #1, "\keep "
```

```
        Call WriteBlankLine(1)
        Call WriteBodyItem(1, "Credential", Dset1![Credential])
        Call WriteBodyItem(1, "Title #1", Dset1![Title1])
        Call WriteBodyItem(1, "Title #2", Dset1![Title2])
        Call WriteBlankLine(1)
        Call WriteBodyItem(1, "Department", Dset1![Department])
        Call WriteBodyItem(1, "Division", Dset1![Division])
        Call WriteBodyItem(1, "Location", Dset1![Location])
        Call WriteBodyItem(1, "Mail Stop", Dset1![MailStop])
        Call WriteBlankLine(1)
        Call WriteBodyItem(1, "Extension", Dset1![Extension])
        Call WriteBodyItem(1, "Dept. Ext.", Dset1![DeptExt])
        Call WriteBodyItem(1, "FAX", Dset1![FAX])
        Call WriteBodyItem(1, "Pager", Dset1![Pager])
        Call WriteBodyItem(1, "VAXMail #1", Dset1![VaxMail1])
        Call WriteBodyItem(1, "VAXMail #2", Dset1![VaxMail2])
        Call WriteBlankLine(1)
        Call WriteBodyItem(1, "Other Info", Dset1![Other])
        Call WriteBlankLine(1)
```

```
        Dset1.MoveNext
```

```
    Wend
```

```
    ' write the RTF file terminators
```



CONTINUED ON NEXT PAGE

Figure 4: These are the main routines in the employee-database-to-RTF translation program.


```

Call EmitRTFTrailer(1)

' close the output file & recordset
Close #1
Dset1.Close

End Sub

Sub WriteBodyItem (FileNum As Integer, ItemName As String,
    ItemData As Variant)

' This handy little routine writes a field title, tabs to the
' first tab stop, displays a detail item in boldface, and forces
' the end of line.

Print #FileNum, ItemName & ":\tab " & "{\b " & ItemData & "}"
Print #FileNum, "\par"

End Sub

Sub WriteIndexFile (TopicTitle As String, ContextString As String,
    FileName As String, IndexField As String,
    InfoField As String, TabStop As Single)

' This routine writes a index to the employee file, consisting of
' a list of hyperlinks and sorted on the specified database field,
' to an RTP file as a single topic. The context string for the topic,
' the name of the output file, and the distance to the first tab stop
' are specified by the caller. The index sorted by employee name
' gets some special handling to include the employee's extension,
' since this is the index used most commonly.

Dim Dbase As Database, Dset1 As Recordset
Dim HotLinkString As String, TargetString As String

' open database and employee info table, set sort order
Set Dbase = DBEngine.Workspaces(0).Databases(0)
Set Dset1 = Dbase.OpenRecordset("CSMC Directory", DB_OPEN_TABLE)
Dset1.Index = IndexField

' open RTP output file for sorted index
Open FileName For Output As #1 Len = 4096

' write RTP file identifier, font table, and color table
Call EmitRTFHeader(1)

```

```

' write index topic heading, but omit keyword and browse sequence
' footnotes for index topics
Call EmitRTFTopicDivider(1, TopicTitle, ContextString, "",
    TopicTitle, "")

' set first tab stop as specified by caller
Call EmitRTFTabStopInches(1, TabStop)

' turn off line wrap for index entries
Print #1, "\keep \cf6"

' now walk through the sorted recordset and write the index topic
' as a list of hyperlinks to the employee detail topics
While Dset1.EOF <> True

    TargetString = "dir_" & LTrim$(Str$(Dset1![ID]))

    ' skip records where the "InfoField" is empty or nonalphanumeric
    If Dset1(InfoField) >= "0" Then

        ' adjust print format for the hotlink if we are sorting by name
        If IndexField = "EntireName" Then
            HotLinkString = Dset1![Extension] & "\tab " & Mcase(Dset1![LastName]) &
                ", " & Mcase(Dset1![FirstName])
        Else
            HotLinkString = Dset1(InfoField) & "\tab " & Mcase(Dset1![LastName]) &
                ", " & Mcase(Dset1![FirstName])
        End If

        ' generate the hotlink and force end-of-line
        Call EmitRTFHotLink(1, HotLinkString, TargetString)
        Print #1, "\par"

    End If

    ' go to the next employee record
    Dset1.MoveNext

Wend

' write the RTP file terminators
Call EmitRTFTrailer(1)

' close the output file & recordset
Close #1
Dset1.Close

End Sub

```

it is passed from one person to another. If you encrypt or password-protect the file in some way, you simply move the problem to a different level.

- Database programs differ widely in their user interfaces and capabilities. Although nearly any existing database application might be able to access the raw data within a dBASE database file, the same cannot be said for forms and reports that might accompany such a file.

- Native databases, especially when they contain multiple tables with complex relationships, typically must trade compactness for speed. Performance is enhanced as indexes are added or a relational database is flattened out into prebuilt "views"—but each additional index or flattening bloats the file.

- Similarly, native databases trade compactness for the highly desirable random access capability. Random access is enhanced if records have a uniform

size, but this results in much wasted space throughout the file.

- An author cannot assume that end users will have a suitable database program for use as a viewer. A user must either purchase the appropriate database product separately, or the author must choose a database (such as Microsoft's Access or FoxPro) that has a royalty-free runtime or somehow arrange to pass on the runtime license fees to the end user.

- The database application or runtime employed by the end-

user has many modules and capabilities that are not needed when the program is merely used as a viewer. This leads inevitably to a great deal of wasted disk space on the end-user's system, unless that database program was already present on the users system for some other reason.

If the database can be somehow transformed into a WinHelp document, on the other hand, the conversion will yield many nifty fringe benefits: familiarity and usability (because of the WinHelp viewer), compactness (because of compression technology), integrity and credibility (because of the monolithic, read-only nature of a WinHelp document), multiple "views" on the data with near-instantaneous access times (because of hyperlinks), and visual richness (because of the use of fonts, bitmaps, and other graphical enhancements).

A TRUE STORY As a practical example of transforming a database into a WinHelp file, I offer the following true-life case history. Names, dates, and places have been passed through an Adobe Photoshop Gaussian filter to blur the details and protect the innocent. Parents

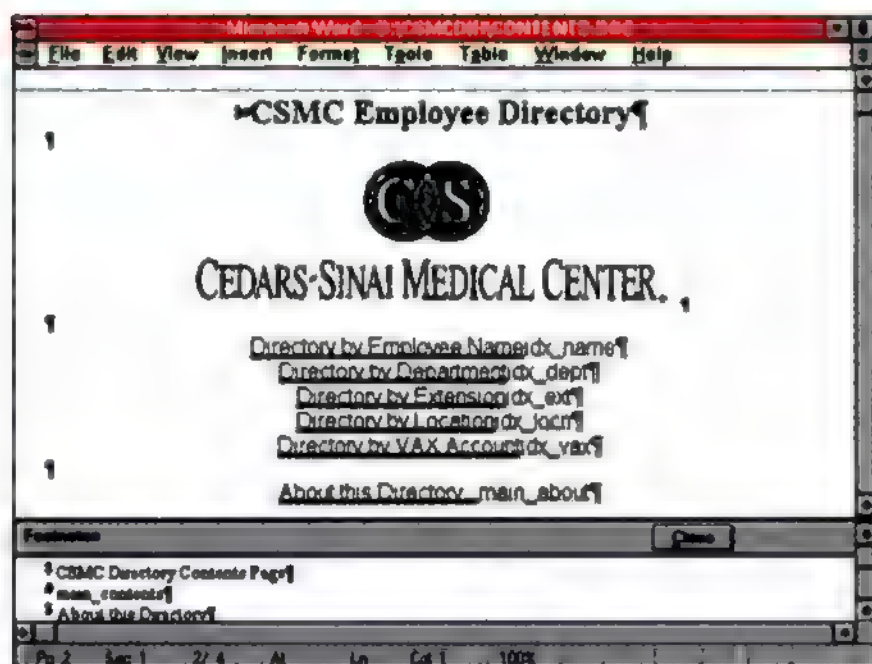


Figure 5: The contents page for the WinHelp version of the employee database was written in Word for Windows and exported to an RTF file.

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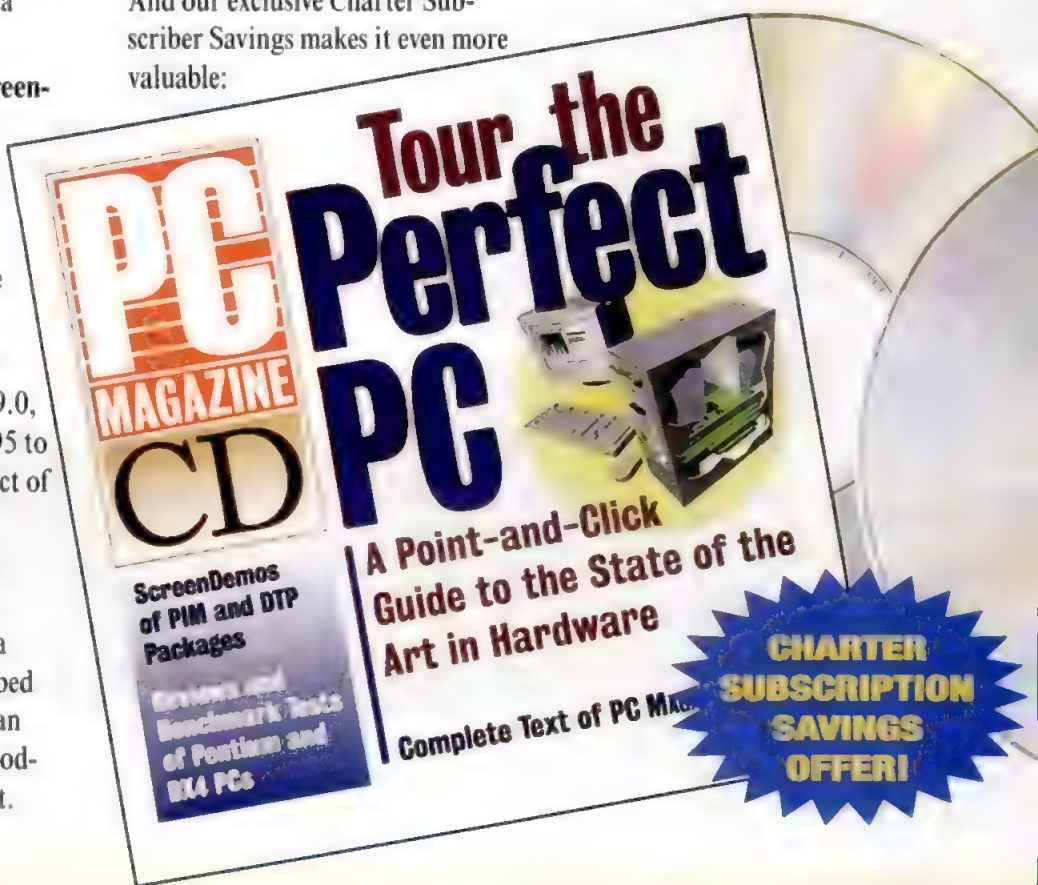
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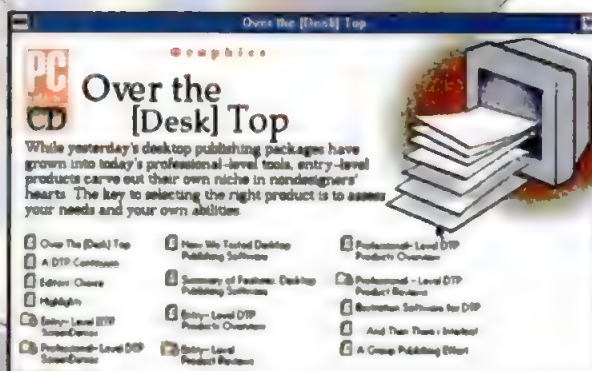
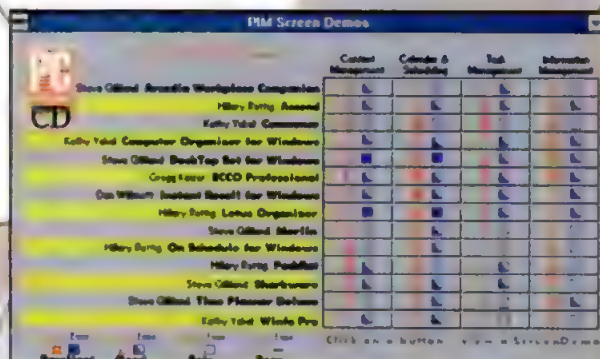
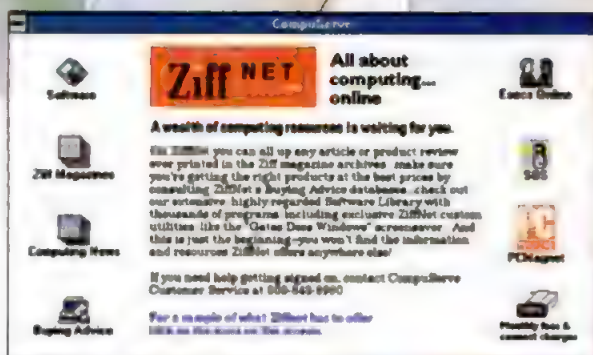


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```
[OPTIONS]
ERRORLOG=error.log
OLDKEYPHRASE=no
CONTENTS=main_contents
TITLE=CSMC Directory
COMPRESS=HIGH
WARNING=3
COPYRIGHT=Copyright (C) 1994 CSMC

[CONFIG]
BrowseButtons()

[WINDOWS]
main = "CSMC Directory", (512, 0, 511, 1023), 0, . . . 0

[FILES]
contents.rtf
idxvax.rtf
idxname.rtf
idxext.rtf
idxlocln.rtf
idxdept.rtf
csmcdir.rtf
```



Figure 6: The help project control file (.HPJ file) for the Windows Help compiler is used to build the WinHelp version of the employee database.

take note: some scenes may be too intense for small children.

In the hospital where I work, the Information Systems Services (ISS) department has expended a great deal of effort over the last year to build an on-line employee directory that resides in a database on the hospital's VAX cluster. You can walk up to a VAX terminal anywhere in the hospital, type in an employee's name, and immediately retrieve that employee's room number, telephone extension, beeper number (if any), and similar information. Unfortunately, this project represents a serious misdirection of energy, because the only employees who are still willingly using VAX terminals are members of the ISS department. All of the other departments who can afford it have long since abandoned VAX terminals in favor of IBM-

as avenues to the employee detail records, as well as the usual WinHelp keyword lookups (accessed by the Search button on the WinHelp button bar). I decided to use Microsoft Access, Version 2.0, as my database platform for manipulating the data and generating the necessary Rich Text Format (RTF) files that would be processed by the WinHelp compiler, mainly because of my previous happy experiences with Access Basic.

The next and most critical step, of course, was to get my hands on the actual data. A member of the ISS department was kind enough to export the employee database to a delimited ASCII text file and then send

compatible PCs or Macintoshes.

Here was a situation tailor-made for WinHelp electronic publishing of an existing database. First, I sat down with a pencil and paper and doodled until I was satisfied with the planned structure for the WinHelp file (Figure 1) and an implementation strategy (Figure 2). I planned to provide multiple sorted lists, selected from the file's contents page,

Mendelian Inheritance in Man electronic publishing project, but in the context of this new project I could see that the old routines should be further generalized and several new ones added. I ended up with procedures for generating each of the following:

- an RTF file header including the file identifier, minimal font and color tables, and the default font and character set commands;
- an RTF file trailer;
- a hypertext jump, or "hotlink," given one string for the visible text and another string defining the target of the hypertext jump;
- an RTF "footnote" given one string defining the type of footnote (context string, title, keyword, browse sequence) and another string defining the contents of the footnote;
- an RTF "tab stop" given the distance to the tab stop in either "twips" or fractional inches;

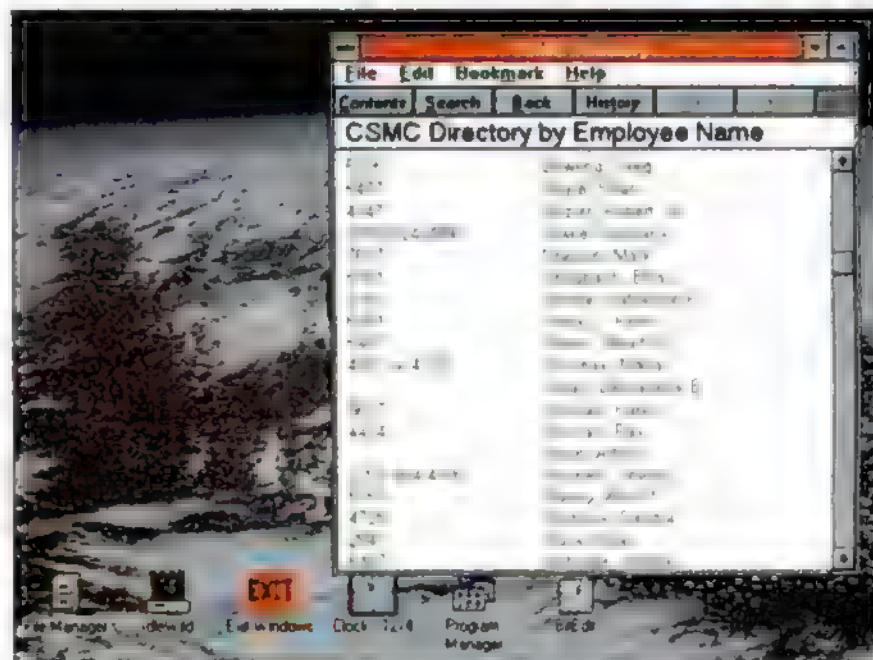


Figure 8: The sorted lists or indexes for the WinHelp version of the employee database are reached by clicking on one of the green hypertext jumps on the contents page.

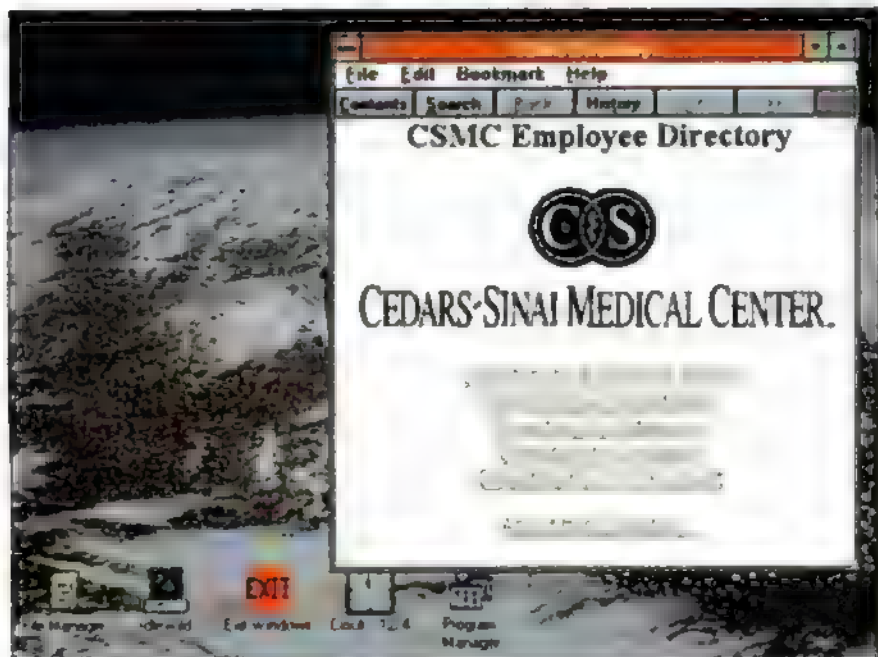


Figure 7: The contents page of the WinHelp version of the employee database is seen here in the WinHelp viewer under Windows 3.1.

it to me as a very large (210K) e-mail attachment along with a description of the database schema. With the data file and schema in hand, it took only a few minutes to define an equivalent database in Microsoft Access, set up an import specification, import the delimited text file into an Access table, and index the table on all of the necessary fields.

I then turned my attention to the issue of RTF generation. I had already written a number of simple RTF production subroutines in the course of the

- an RTF "topic divider" together with a nonscrolling topic heading and all the necessary context string, keyword, title, and browse sequence footnotes.

Once this library of RTF subroutines (Figure 3) was fully tested, it was straightforward to throw together the rest of the database-to-RTF translator program (Figure 4). WriteIndexFile() is a general purpose routine that creates a sorted list of hyperlinks that can be used to "look up" an employee detail record, writing the list to an RTF file as a single "topic." WriteBodyFile() walks through the database and outputs employee detail records, one per topic, to another RTF file. The labels or context strings for the topics in

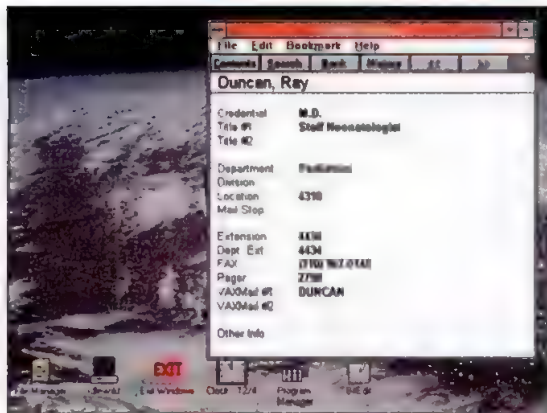


Figure 9: An employee detail record in the WinHelp version of the employee database is reached by first selecting one of the sorted lists or indexes from the WinHelp file's contents page, then scrolling through the sorted list and clicking on an employee name.

the body are functions of each employee's record number in the database (assigned automatically by an Access counter field). The Main() routine of the conversion program calls WriteIndexFile() for each index that needs to be generated, generating a distinct RTF file for each, and then

calls WriteBodyFile() once to produce an RTF file containing the employee detail records that are pointed to by the hyperlinks in the index files.

The remaining pieces of the project were a contents page (Figure 5) for the WinHelp file and a project control file (.HPJ file, Figure 6) containing the directives for the WinHelp compiler. The Contents page, consisting of a title, the company logo as a Windows device-independent bitmap, and hotlinks to each of the sorted lists, was written as a Word for Windows document and exported to an RTF file. The .HPJ file was written with Windows Notepad and saved as a plain ASCII text file, but any other ASCII text editor could have been used as well. The various RTF files and the .HPJ file were then gathered together in a directory and compiled into an .HLP file with Microsoft's HCP.EXE version 3.1.505. Screenshots of the final .HLP file in action

are shown in Figures 7, 8, and 9.

Now let's talk facts and stats. Size of the original delimited ASCII text file: 210K. Size of the generated RTF files, including the company logo bitmap: 2.6MB. Size of the compiled HLP file: 1.8MB with COMPRESS=OFF, 810K with COMPRESS=HIGH. Time to compile: 5 minutes on a 66-Mhz 486 with COMPRESS=OFF, 27 minutes with COMPRESS=HIGH.

The Microsoft Access database containing all the Access Basic routines shown in this column (but omitting (thankfully) the employee data), along with the .HPJ file necessary to build the WinHelp version of the database, is available on PC MagNet in the Programming Forum as the file PPV14N5.ZIP. I'm hopeful that you will find this file to be a convenient jumping-off point for your own database publishing projects.

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Utilities

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DefEdit: The Missing Links

Double-click on a filename in File Manager: a program runs, loading the file for you to work on or view. But this feature relies on an association between the program and the file's extension type. File Manager does not let you set a default editor for all those hundreds of files that don't have an explicit program association. This issue's utility, DefEdit, fills this missing link in the Window's desktop.

DefEdit is a Windows 3.1 program that lets you define an editor that will be used to open any file without an association. It works by replacing the two critical Windows API functions that implement data file associations. The default editing feature supplied by DefEdit will work with any Windows program that uses the standard association functions.

You can obtain DefEdit by downloading it from *PC Magazine's* PC MagNet. (See the sidebar "Guide to Our Utilities & How To Get Them" for downloading instructions.) For programmers who would like to view or modify the code, the source files are also available. Be warned, however, that DefEdit plays some tricks with the machine language code generated by the compiler. It may take extra work to migrate the code to compilers other than Microsoft C 6.0. or Borland's C++ 3.1.

To install DefEdit, copy the files DEFEDIT.EXE and DEDLL.DLL to a directory on your hard disk. Run DEFEDIT.EXE by selecting the File | Run menu item from Program Manager. DefEdit's own dialog appears, having two critical buttons: Set Editor and Install.

Clicking on the Set Editor button

brings up a simple dialog that contains a field for entering the name of your default editor. (DefEdit defaults to the Windows Write applet, since that editor is available on any computer running Windows.) See the screenshot in Figure 1. You can change the default editor to any program on your machine, preferably one that can read many different file formats.

The easiest way to specify the editor is to enter the name of the editor, including its path, in the Default Editor box. DefEdit will automatically pass the name of the file you open to the editor. If, however, you need more control over the editor command line, DefEdit can help.

The editor string can use special characters to give information about the file to be opened. The following special parameters are available:

^ filename including path but not the extension

^f filename only
^e extension only
^p path only, without filename or extension

Since the association strings in the Extensions section of WIN.INI use the ^ (caret) character to represent the filename with path information, so does DefEdit. A ^ without a trailing p, f, or e stands for the fully specified filename without the extension.

The combination ^f (a caret immediately followed by a lower case f) stands for the filename without the path and extension. When DefEdit sees ^f, it substitutes only the filename. The ^e combination stands for the file's extension. If the file does not have an extension, the ^e is ignored. A ^p combination stands for the path of the filename, and is handy for editors that can specify their working directory from the command line.

For ^p to work, the calling program (usually File Manager or Program Manager) must specify the path. File Manager always provides the complete path for files being opened. Program Manager's File/Run option will provide the complete path if you use the Browse dialog, or if you type the complete path in the edit box.

Some examples are in order. Say you want to use the Windows Notepad applet instead of Write. If you set the editor string to

NOTEPAD

and the file you opened was C:\WINDOWS\SYSTEM.TXT, DefEdit would interpret this as

NOTEPAD C:\WINDOWS\SYSTEM.TXT

This will work as long as the file is in the directory specified. If the file you opened was typed in simply as SYSTEM—without an extension—DefEdit would interpret this as

NOTEPAD SYSTEM

When Notepad sees a filename without an extension, it assumes the extension .TXT; so as long as the current directory is the

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2	WTIME - Keeps PC clock accurate
3	INCTRL - Controls Windows installation
4	FINDIR - IRQ line analysis
5	PCMKEY - Command line editor
6	BUGS - Windows 3.1 screen saver
7	PASTE - Enhanced Windows clipboard
8	WPNT - Highlights Windows presentations
9	MYGRPS - Customizes group icons
10	WINCMD - Command file interpreter

This list is based on the total number of downloads each utility has had on PC MagNet over the past month. To download these files, type GO ZNT:TIPS. For more information, see the sidebar "Guide to Our Utilities & How to Get Them."

one with the file, DefEdit would find it.

For DefEdit to open a file with a different extension, for example SYSTEM.BAK, you'd have to add the extension to the default edit string:

```
NOTEPAD ^.^e
```

DefEdit replaces the first ^ with the filename and the path, if given. Since you did not give a path, the first ^ would be replaced with SYSTEM. The dot following the ^ is copied over literally. Then DefEdit replaces the ^e combination with the file extension .BAK, resulting in the completed command:

```
NOTEPAD SYSTEM.BAK
```

This will work as long as the file SYSTEM.BAK can be found in the current directory.

To sum up, the different parameters let you specify any combination of path, filename, and file extension that your editor may need. Even simple editors like Notepad sometimes need a special configuration.

To complete the installation, click on the Install button. DefEdit will offer to restart Windows for you—necessary because DefEdit replaces SHELL.DLL, which is always in use by Program Man-

Windows session at that moment, click the Cancel button. Then when you are ready to restart Windows, run DefEdit again and click on Install. Or, if you prefer, you can complete the installation from DOS. To do this, exit Windows, change to the directory that contains DefEdit, and type DEINST at the command line. This runs a small batch file created by DefEdit. After running DEINST, restart Windows.

When DefEdit is installed, the Install button changes to an Uninstall button so that DefEdit can be removed with a button click. As with Install, when you click on Uninstall, DefEdit will ask whether it may restart your Windows session. If you prefer not to restart Windows at that time, just choose Cancel; you can run DefEdit at a later time and click on Uninstall, or you can remove DefEdit from DOS by running DEINST.BAT.

Once DefEdit is installed, it works transparently. There is no need even to think about DefEdit unless you want to change the default editor. To change the editor, run DefEdit again, click on the Set Editor button, type in a new editor string, and click on the OK button. You do not need to reinstall DefEdit or restart Windows if you are simply changing the editor.

INSIDE DEFEDIT As you might have surmised by the discussion of the manual installation process, DefEdit performs its magic by replacing the SHELL.DLL. There are two crucial Windows API functions implemented by SHELL: FindExecutable and ShellExecute. These functions use values in WIN.INI and the system registry to locate the proper editor for a file based on the file's extension. DefEdit intercepts these two functions before Windows—or, more accurately, SHELL.DLL—can see them.

Without some rather drastic measures, there is no way to intercept a call from a program to a DLL. The options are to rewrite and recompile the calling program or the DLL to call the intercept routine, patch the program or DLL so that it calls the intercept routine, or simply replace

the entire DLL, which is how DefEdit works.

Before I discuss replacing the DLL, I'll talk about why DefEdit did not use the other methods for intercepting DLL calls. Clearly, recompiling SHELL.DLL or all its calling programs was out of the ques-

```
push    ds
pop      ax
nop
inc      bp
push     bp
mov      bp, sp
push     ds
mov      ds, ax
sub      sp, x

[insert real code here!]

dec      bp
dec      bp
mov      sp, bp
pop      ds
pop      bp
dec      bp
retf     y
```

Figure 2: This is the prolog and epilog code used for far functions in Windows programs.

tion, since I don't have access to the necessary source code. Some debuggers can patch the code of a DLL to monitor the calls made to it, but this involves saving and writing over the actual machine language code in the DLL—not something I am not comfortable doing. Another possibility is to patch the export table in the DLL. (The export table lists all the functions in a DLL that can be called from another program.) But this approach is more difficult than it might appear at first glance, because the specified offsets are near pointers within a logical segment, not far pointers that specify both a segment and offset.

I chose to follow the safest route: to create a replacement for SHELL.DLL. This is not as difficult as it first may seem. I did not have to handle all of the more than 20 functions in the DLL—just the two I wanted to change. For the other functions, it was only necessary to replicate each call with something like the following:

```
returnvalue MyGenericProcedure
((parameters for that procedure)) {
    return OldGenericProcedure
    ((parameters passed for
    that procedure));
}
```



Figure 1: This simple dialog box contains a field for entering the name of your default editor.

ager: Replacing SHELL.DLL while Windows is running can cause problems. When you click on the Restart Windows button, DefEdit will shut down your Windows session, make the proper changes, and then restart Windows.

If you do not want to shut down your

In order to replicate each call successfully, I had to know all the functions in the DLL, and the number and size of the parameters passed to each function. The names of the functions are available through one

of many header-dump programs available. I used the MapWin utility that comes with the informative book *Undocumented Windows* by Andrew Schulman, David Maxey, and Matt Pietrek. MapWin lists each of the exported functions in a DLL and all the calls a DLL or program makes to other DLLs. Unfortunately, it does not (nor could it) provide the parameters for each of the functions.

While the parameters for functions such as FindExecutable and ShellExecute are known because they are documented in the Windows Software Development Kit (SDK), not all the functions in SHELL.DLL are documented. A search in *Undocumented Windows* was not helpful, since Schulman and his gang focus on the main parts of Windows—Kernel, User, and GDI—and ignore Shell. The idea of disassembling all the functions within SHELL did not sound inviting, so I settled on writing a generic function that would simply jump to the old function when called. What resulted was a DLL composed of these generic functions. I call this a *generic DLL*.

```
nop
nop
nop
inc     bp
push    bp
mov     bp, sp
push    ds
mov     ds, ax
sub     sp, x
```

[insert real code here!]

```
dec     bp
dec     bp
mov     sp, bp
pop     ds
pop     bp
dec     bp
retf    y
```



Figure 3: The prolog and epilog code are modified as shown here when used for external entry points in programs.

CREATING A GENERIC DLL To write a generic DLL, you must create a DLL with the same entry points as the original DLL. The idea is simple. Load the old DLL after loading the generic DLL, and when

an entry point is called, jump to the entry point of the old DLL. The idea is simple, but the implementation is not. To understand why you cannot just jump to another DLL's entry point, it helps to know how Windows manages calls to different programs and DLLs.

When a compiler creates a Windows

program, it adds extra code, called the *prolog* and *epilog* code, to every far procedure call. Far procedures are procedures called from another code segment. The prolog code sets the data-segment register to point to the segment containing the data for the program or DLL. When Windows loads a program or DLL into memory, it modifies the prolog code (Yes, Windows modifies the code in the program!) depending on whether it's an internal far call, a far call meant for export, or a far call to a DLL function.

The unmodified prolog code, shown in Figure 2, actually does quite little. In fact, the code seems to contain plenty of unnecessary instructions. Actually, the prolog code is designed so that Windows can modify it to fit the situation.

The first two instructions put the value of DS into AX. Later, after some work with the BP register, the value of DS is saved on the stack and AX is loaded into DS! So in the unmodified prolog code, DS is not changed. This unmodified prolog is used for far calls made internally, inside the program. Why is the code necessary at all if the far calls are made within a program?

The reason lies in the history of Windows. In Windows 1.x, 2.x, and 3.0 Real mode, programs were executed in the Real mode of an Intel processor. In Real mode, segment registers contain actual pointers to the segments loaded in memory. So, if a segment was moved, the values

in the segment registers changed. Since Windows moves segments, the values of the segment registers had to be modified whenever a segment was moved within memory. Knowing that all far functions used the Windows prolog code, Windows could "walk the stack" of a program to modify the saved values of DS if the data segment was moved in memory.

Of course with the advent of protected mode, the need to modify the value of DS is eliminated since DS points only to an entry in a descriptor table. If a segment is moved in protected mode, only the descriptor for that segment must be changed, not the value of DS itself. Even when a program is written exclusively for protected mode, however, the prolog code is still used because of how Windows manages multiple copies of the same program running at the same time.

When a far procedure is listed in the table of external entry points, the prolog code is modified to look like the code in

```
mov     ax, zzzz
inc     bp
push    bp
mov     bp, sp
push    ds
mov     ds, ax
sub     sp, x

[insert real code here!]

dec     bp
dec     bp
mov     sp, bp
pop     ds
pop     bp
dec     bp
retf    y
```



Figure 4: The prolog and epilog code are modified as shown here when used for external entry points in DLLs.

Figure 3. The instructions that previously stored DS in the AX register are wiped out, replaced with NOPs. The result is that DS is loaded with whatever is in AX before the procedure is called.

Windows creates an additional code fragment for each copy of a program that is run. When the entry point is called, the call is actually made to this code fragment, called a *thunk*, which loads AX with the proper data segment and jumps to the old code. Thus different copies of the same program can use the same code segment, but each has its own data segment. Each copy of the program has its

own set of thunks for the entry points in the program, and the modified prolog loads DS with the value in AX—the data segment for the specific instance of the program.

Programs use different data segments for each instance of the program, but DLLs use the same data segment no matter how many different programs request the DLL to be loaded. So, for DLLs, the external entry points for DLLs look like the code in Figure 4.

The MOV AX,zzzz instruction loads AX with the value of the data segment for that DLL. The original prolog contains a NOP after the instructions that store the contents of DS in AX. The reason for that NOP is that the DLL version uses an instruction that takes 3 bytes. In order to have the DLL version precisely overwrite the original prolog, the corresponding code has to also be 3 bytes.

Windows programmers almost never have to be concerned with the prolog and epilog code used in Windows programs. All that is usually necessary is to set the proper compiler switches; the compiler takes care of the rest. But if you are interested in learning more about the Windows prolog and epilog code, read Chapter 7 of the classic tome *Programming Windows* by Charles Petzold.

would be corrupted with the register addresses that the prolog code has pushed onto the stack. So before we can jump to the old entry point, we must first clean off the stack by removing the values that the prolog code pushed onto it. At the same time, we must be careful not to make changes to any of the registers (except AX, which is trashed on all calls to a DLL).

The generic DLL uses the code fragment shown in Figure 5 for each entry point passed to the old DLL. The routine is written in assembly language to maintain control over the values in every register. Assembly language also has the advantage of being small and fast. Note that although you don't see it, the prolog and epilog code is placed around this small procedure by the compiler.

DefEdit's install process renames SHELL.DLL to OLDSHELL.DLL. OLDSHELL.DLL (the original DLL) is loaded by DEDLL (the generic DLL) during the LibMain routine, and the original function pointer is saved.

original register. Note that this is the only reference made to data in local memory. Once DS is overwritten, the code no longer has access to its own data segment.

Once the old function pointer is placed on the stack, the other values are popped off into their original registers. Control is then transferred to the original DLL by performing a far return (RETF) instruction. This works because RETF gets

its return address from the stack, and we have manipulated the stack so the return address location holds the address to which we want to transfer control. A jump instruction is not possible since there is no way to specify the destination of the jump without saving it in the data segment, which, as I mentioned, we no longer have access to.

Notice that the routine contains pops of the DI and SI registers. This is because Microsoft C, Version 6.x, saves these registers whenever an _ASM block is defined. Since the _ASM block is exited abnormally with the RETF instruction, the implicit popping of DI and SI is not performed as it normally would be at the end of the _ASM block. If you compile DEDLL.C with another compiler that handles the _ASM blocks differently, you will have to modify this generic procedure.

For programmers who use the Borland compiler, the source code contains conditional compilation blocks with the changes necessary for compiling under Borland C++ 3.1. These changes include the different syntax necessary to define macros with embedded assembler statements, and popping DI and SI in reverse order. Those using other compilers will have to create an assembly file, then walk through it to make sure all the register values are restored and the values the prolog code has placed on the stack have been removed.

Constructing the generic DLL was the hard part of writing DefEdit. The replacement routines for FindExecutable

DefEdit fixes an annoying hole in Windows 3.1. The technique of the generic DLL provides plenty of opportunity to replace other Windows functions.

```
void CALLBACK fnptr (void) {\n    _asm {\n        lds     ax,OldFnPtr      ;Get return address on stack\n        xchg    ax,ss:[bp-2]     ;Get saved value of DS and replace\n                                   ; it with the offset of the target address.\n\n        push    ax              ;Save DS for now\n        mov     ax,ds           ;Get the segment of the target address\n        xchg    ax,ss:[bp]      ;Exchange it with the saved BP\n        dec     ax              ;Dec BP because prolog Inc'd it\n        mov     bp,ax           ;Restore original BP value\n        pop     ds              ;Restore original DS\n        pop     si              ;Clean off DI and SI. This is reversed\n        pop     di              ; for Borland compilers.\n        retf                   ;Use RETF to jump to target address. RETF\n                                   ; uses the address exchanged with BP and\n                                   ; DS on the stack. The original return\n                                   ; address remains unchanged on the stack.\n    }\n}
```



Figure 5: This is the generic routine used by DefEdit to jump to the function in the old DLL.

The generic DLL performs what amounts to system-wide GOTO statements. To create a routine that does this, bypassing the standard entry and exit procedures, we need to perform some housecleaning first. If we simply jump to the old DLL's entry point, the stack still

In the code shown in Figure 5, the original function pointer is loaded from the generic DLL's memory, then saved on the stack in place of the saved values of DS and BP. Since the segment and offset are placed, not pushed, on the stack, the original value can be restored to its



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and ShellExecute to add the editing functions were almost trivial to write by comparison. The FindExecute routine first calls the old FindExecute routine to see if there is a valid association. If so, the procedure returns to the calling program. If no association exists, the result string is loaded with the default editor name before returning.

The ShellExecute function is just as

simple. It first calls FindExecutable to see if an association exists. If FindExecutable indicates that an association does exist, the call is passed to the old ShellExecute function. If no association exists, the default editor is launched with the WinExec function, with the name of the data file passed as an argument.

DefEdit fixes an annoying hole in Windows 3.1. The technique of the gener-

ic DLL provides plenty of opportunity to replace other Windows functions. In a few issues, I will use this technique again to fix an even bigger problem with the Windows shell. Until then, take advantage of the new default editing capabilities provided by DefEdit. □

DOUGLAS BOLING IS A CONTRIBUTING EDITOR OF PC MAGAZINE.

GUIDE TO OUR UTILITIES & HOW TO GET THEM

DefEdit

PURPOSE: DefEdit lets you set a default editor for document files with extensions that haven't been associated with a particular program.

SETUP: To install DefEdit, copy the files DEFEDIT.EXE and DEDLL.DLL to a directory on your hard disk, run DEFEDIT.EXE, and click on DefEdit's Install button. DefEdit will offer to restart Windows to complete the install process. If you don't want DefEdit to restart Windows, the install process can be completed manually by performing these steps:

1. Run DefEdit and click on the Install Button.
2. When DefEdit asks if it is okay to restart Windows, click Cancel.
3. Exit Windows so that you are at the DOS prompt.
4. Change to the directory containing DefEdit.
5. Run the batch file DEINST
6. Restart Windows.

REMARKS: If you do not specify an editor, DefEdit uses Windows' Write accessory as the default editor. To change the default editor, run DefEdit and click on the Select Editor button. The editor string must consist of at least the name of the editor. If this is all you enter, the name of the file you open will be appended to the end of the editor name.

Special parameters tell DefEdit to treat the filename in special ways:

```
^ filename including path without extension
^f filename only
^e extension only
^p path only, without filename or extension
```

For example, the editor string

```
NOTEPAD ^.^e
```

tells DefEdit to append the file name, a period, and then the file type.

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PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

HARDWARE

Too Many Printers

I need to connect three different printers to my office computer, so ideally I should have three parallel ports. I currently have two parallel ports—assigned to IRQs 5 and 7—and so I must use an A/B switch on one port to connect to two printers. I can find parallel cards that support only these IRQs; are there any that will use one of the higher IRQs, such as 11? Normally, all three printers do not run at the same time, but it could happen; what would be the impact of assigning two different parallel ports the same IRQ? Since this computer also serves as the file server for a point-of-sale system, a system crash would be inconvenient, to say the least. Do you have any suggestions?

*David C. Rose
Farmington, Arizona*

PC MAGAZINE: There are a number of available solutions that do not require a third parallel port but that can liberate you from the having to remember to flip the A/B switch all the time.

The easiest way would be to use a serial port for one of the printers. Many printers (including many laser units) include a serial port as a standard feature, so you could use an available COM port on your computer. If none of your printers has a serial port, you could use a serial-to-parallel converter. Such devices are available from a variety of sources, including Black Box (412-746-5500), and start at less than \$100.

Another solution would let you use a single parallel port for all three printers. Most people think of printer-sharing devices as ways to connect more than one computer to a single printer, but many of

these products can be used to connect a single computer to many printers. In such a setup, you select the printer you want to use by sending a command before the print job; most software lets you define a printer setup command in its configuration, which you can use to send the switching instructions. There are a number of manufacturers who make such products, including devices that buffer the output and thus return control to your computer quickly. Again, Black Box has a variety of such products, starting at \$140 for a two-printer device.

I do have to question putting all this activity on your point-of-sale server, however. In addition to the potential of an application crash bringing down the whole system, it would seem that this could also degrade performance. If the server's processing requirements are not too demanding (and it would appear that they are not), you might want to consider investing in an inexpensive system dedicated to that task. I suspect that you could configure a simple system for about \$500.

—*Alfred Poor*

Convenient Copies

TIP I occasionally need to print more than one copy of a document in a Windows program, but the driver for my ink

jet printer does not have an option for printing multiple copies. I use the Windows Control Panel Printers utility to change the output device from a parallel port to the FILE option. When I print the document, the program prompts me for a filename. I then use a QuickBASIC program to print this file as many times as I specify:

```
INPUT "Enter number of copies
wanted";n
FOR I = 1 to n
  SHELL "COPY [pathname and
  filename] /b LPT1
NEXT
```

You can use a port other than LPT1 if your printer is connected to a different port. The /b switch is necessary because print files containing graphics can have a Ctrl-Z character ("Z"), which DOS uses to indicate the end of a file. The switch tells DOS to ignore this end of file character.

*Raymond M. Ingels
Monterey Park, California*

PC MAGAZINE: This is a handy tip that will work with just about any printer. Most laser printers buffer an entire page at a time and already have a command that can cause multiple copies of the page

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See index, page 316.

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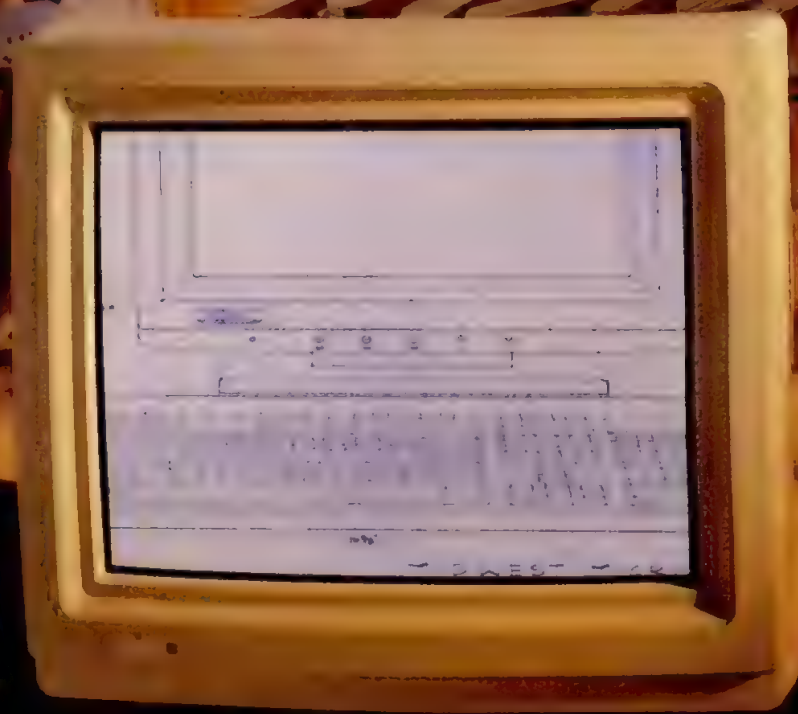
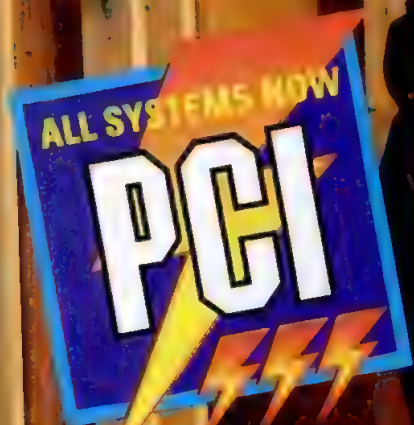
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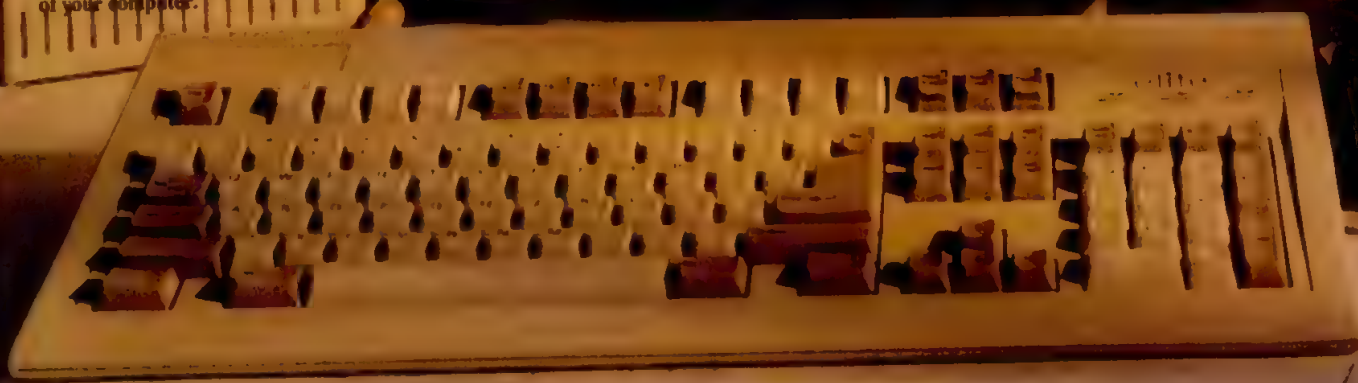
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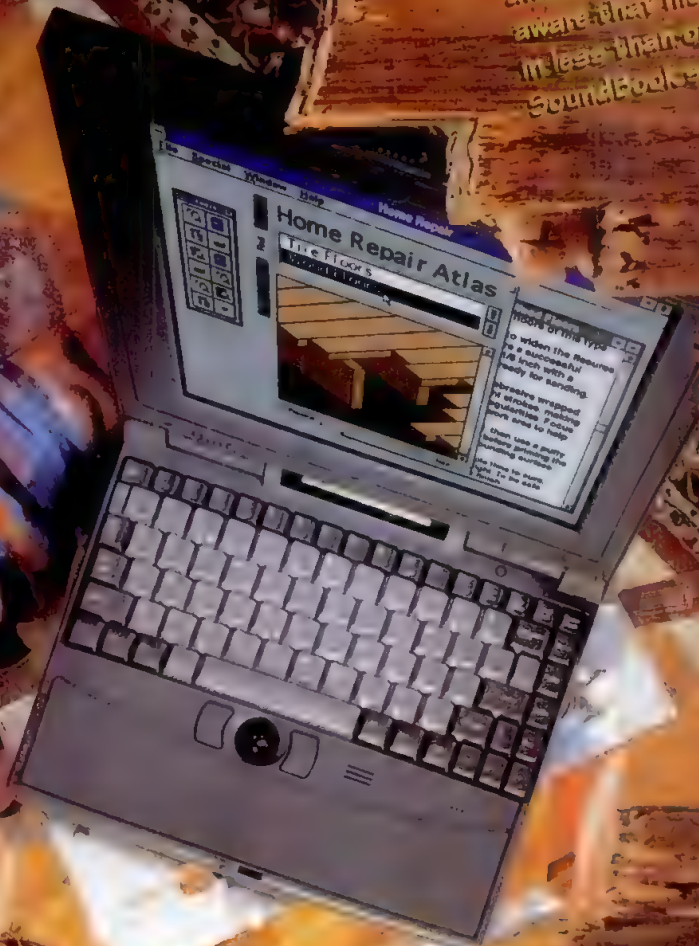
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Minutes ago, Eugene had no idea that his dining room ceiling couldn't support a 50 pound chandelier. He also had no idea how filthy his attic really was. Now he is painfully aware of both. He is also painfully aware that his wife is due home in less than one hour. Luckily, his SoundBook survived the mishap.



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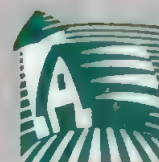
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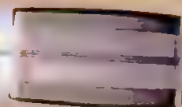
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to be printed. Most ink jet printers and all impact dot matrix printers buffer only a line or so at a time, so there is no complete page image to repeat. Mr. Ingels's tip works by using the computer's disk as a buffer.

If you always use the same filename for your output, you can hard code its path and name into the QuickBASIC program. Alternatively, you can use different names for your output files so that you can print additional copies of the pages at a later time without having to rerun your original application.

You could also use a batch file to accomplish a similar result, though you would have to make one for each number of copies that you want to print. To make a 2COPIES.BAT, just create this text file:

```
copy %1 LPT1 /b
copy %1 LPT1 /b
```

You can then pass the name of the file to the batch file when you run it. On the other hand, if you always use the same filename for the output, simply put the path and name in place of the %1 parameter.—*Alfred Poor*

HOW TO CONTACT US

Do you have a hardware, software, or systems problem you can't solve? Do you have a tip you think other readers could use? Perhaps you'd like a better understanding of how something works. If so, we invite you to tell us about it. Our experts can give you practical solutions to your problems, provide techniques for using your software and hardware more productively, and help you grasp computer concepts and understand the latest technology.

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Ethan Winer is a contributing editor and the author of *PC Magazine BASIC Techniques and Utilities*.

■ OPERATING ENVIRONMENTS

Backing Up a Compressed Drive

❓ When you back up a compressed disk (whether it's compressed with DoubleSpace or Stacker), is it necessary to back up both the compressed drive and the host drive? You can save floppy disks by backing up only the compressed drive, but I'm not sure if that will work.

*Ron Griffith
via ZiffNet*

❓ I have a 120MB hard disk that has been DoubleSpaced. I use PC Tools for Windows to back up my compressed drive on a regular basis. Does it make any sense to back up my uncompressed drive containing the Windows permanent swap file and important DoubleSpace files (such as DBLSPACE.BIN and so forth)? If not, in the event of a fatal crash, what's the best way to use my backup set to restore my compressed and uncompressed drives?

*Tony Kazarian
Highland Park, Illinois*

► **PC MAGAZINE:** One thing's for sure: You do not want to back up both the compressed drive and the compressed volume file on the host drive. If you do that, you're expending floppy disks backing up the compressed files twice. There are two alternatives. You can boot without your compression software and back up the entire host drive, including the compressed volume file. Or you can let the compression software run normally and back up the compressed drive and the host drive separately. When the compression software is active, the compressed volume file isn't accessible as a file on the host drive, so there should be no overlap.

The compressed volume file always occupies the same amount of space on the host drive, whether it's full or empty. If the compressed drive is mostly empty, it makes sense to back up the compressed drive and the host drive separately. That way, you avoid spending disks on backing up the unused portion of the compressed drive. If the compressed drive is pretty full, however, it may be easier just to boot without the compression software and make one backup of the entire host drive.

To boot DOS without DoubleSpace, reboot and watch for the message "Starting MS-DOS;" press Ctrl-F8 when you see it. DOS will now boot without DoubleSpace, and also ask for confirmation of each line in your CONFIG.SYS (and, in DOS 6.2, your AUTOEXEC.BAT). Chances are good that some of the lines in these two files reference drivers or programs stored on the compressed drive, so look carefully. You can also press Ctrl-F5 to boot entirely without DoubleSpace, CONFIG.SYS, or AUTOEXEC.BAT.

To restore after a fatal crash, you'd first restore the host drive and then reboot. If you backed up the entire host drive including the compressed volume file, you're done. Otherwise, when the system reboots with the compression software running, you restore the separate backup of the compressed drive.

One more thing: There's no good reason to back up the Windows permanent swap file (a hidden file named 386SPART.PAR). This file is relevant only while Windows is running. If it goes missing or gets corrupted, Windows can

re-create it. It's best to set your backup software to omit this file.

—Neil J. Rubenking

Cluster Size on a Compressed Drive

❗ After reading the Tutor article "Unlocking the Mysteries of CHKDSK" (May 11, 1993), I was wondering what the minimum cluster size would be with DoubleSpace. I have a 170MB hard drive. According to the article, I would have a minimum cluster size of 8 sectors or 4,096 bytes. If I use DoubleSpace to increase my disk size to 340MB, is my minimum cluster size still 8 sectors, or will it be 16 sectors because the disk now holds over 256MB of information?

Peter Reiff
via MCI Mail

► **PC MAGAZINE:** The cluster size of an uncompressed drive affects how much space will be wasted in partially filled clusters. For a compressed drive, this waste doesn't

occur, whether the compression is performed by DoubleSpace, DriveSpace, or Stacker. DoubleSpace in particular always uses 8K (16 sector) clusters, but it avoids waste with a technique called cluster packing. If one file doesn't fill a whole cluster, the compression software can use the remaining space for another file. Stacker 4.0 gets even better compression by using sector packing. If the last 512-byte sector of a file is not completely filled with data, Stacker can recycle the remaining space in that sector for use by another file. Refer to the Tutor column "DOS 6.0's DoubleSpace: Is It Safe?" in our issue of November 23, 1993, for more details on the inner workings of DoubleSpace.—Neil J. Rubenking

WORD PROCESSING

Toggle Case in WordPerfect 6.0

✓ **TIP** WordPerfect 6.0 for DOS lets you change case for a block of characters, but there's no simple way to toggle between

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SMC

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Ultra16 10BT 6pk	459.23
Ultra16 10BT 24pk	1573.71
Ultra16 Ethernet combo	107.71
Ultra16 combo 6pk	569.15
EtherCard+ Elite combo	139.57
TigerHub TP6 6 port + AU1	177.90
TigerHub TP6B 6 port + BNC	185.63
TigerHub TP12 12 port + AU1	379.79
3608 Ethernet 8 port hub 10BT	298.85
3512 Ethernet 12+2 port hub 10BT	548.55
PC600WS ARCNET coax	119.99
PC600WS ARCNET TP	119.99
ARCNET 8 port active hub 10BT	229.41
EtherCard Elite 15M	249.89

3Com

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3C503B Ethernet II coax	114.14
3C503B Ethernet II coax 5pk	479.45
3C503B Ethernet II 10BT	111.14
3C503B Ethernet II 10BT 5pk	442.36
3C503B Ethernet II 10BT 5pk	123.77
3C503B Ethernet II 10BT 5pk	529.78
3C579 Ethernet EISA coax	229.91
3C579 Ethernet EISA 10BT	229.91
3C579 Ethernet EISA 10BT	631.51

OTHER TOP-QUALITY NAME BRANDS

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Eagle NE2000+ 10BT	99.46
Eagle NE2000+ 10BT TPA	429.61
National Semi NE2000+ coax	73.74
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PP403 Parallel port multiplexer	77.99

IBM

IBM Token Ring 16/4 ISA	299.94
IBM Token Ring 16/4 MCA	499.56
IBM Token Ring MAU	409.95

intel.

EtherExpress PRO/10 Flash 10BT	111.07
EtherExpress PRO/10 Flash 10BT 5pk	482.72
EtherExpress PRO/10 Flash combo	115.07
EtherExpress PRO/10 Flash combo 5pk	505.86
EtherExpress 16 coax	99.33
EtherExpress 16 coax 5pk	454.13
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EtherExpress 16 10BT 5pk	454.13
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EtherExpress Flash 10BT 5pk	515.62
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Link MAX900 amber/green/white	309.70
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Wyse 60 amber/green/white	279.40
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ASP

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Bermouth 230MB Inader SCSI	454.44
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1200+ 40B SCSI external	2045.39

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Edumment CD 2X kit internal	433.14
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Pioneer DR1804X 4X 18 disc	1699.89
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Plestor 4plex quad internal	422.72
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Sony CDU-55E 2X internal	139.90
Sony CDU-55S SCSI 2X internal	169.70
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ScanJet 3P document feeder	179.57
ScanJet HCX W/ISA interface	969.86
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MICROTEK

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Scanmaker IIS-R color	1094.80
Scanmaker 35T slide scanner	975.72

Summagraphics

Summagraphics III 12 X 12 16 button	253.99
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Mag Innovation DX15F	339.00
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T2400CT 320MB act color	3439.55
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Canon

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Xircrom Token Ring 16/4	449.18

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- ✓ 8.4" active-matrix color display (360C, 360CE)
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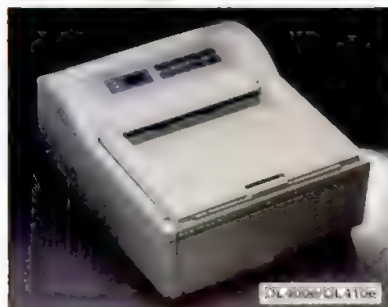
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```

DISPLAY(Off!)
IF(NOT ?BlockActive)
PosCharNext PosCharPrevious
ASSIGN(VAR1;?RightChar)
ASSIGN(VAR2;CTON(VAR1))
  IF(VAR2<97)
    TYPE(TOLOWER(VAR1))
  ELSE
    TYPE(TOUPPER(VAR1))
  ENDF
DelCharNext
ENDIF

```



Figure 1: This WordPerfect 6.0 macro will toggle the character the cursor is on from uppercase to lowercase or vice versa.

uppercase and lowercase for a single character. The macro shown in Figure 1 provides a toggle to convert whichever letter the cursor is on to the opposite case. Assign the macro to an Alt key combination, and you can move through your text quickly converting several characters in a row or selectively converting specific characters.

The third line of code, PosCharNext PosCharPrevious, is a workaround that theoretically should not be necessary. Without it, however, the macro sometimes locks up when you try to change the case of several letters in a row by running the macro several times in succession.

Larry Christenson
Northome, Minnesota

► **PC MAGAZINE:** The macro in Figure 1 can be a handy tool for toggling case for one character at a time. You can make it even more useful by adding the code in Figure 2, which will let you toggle case for a block of text. (The complete macro is available for downloading from the Utilities/Tips forum on PC Mag-Net, as ULCASE.ZIP.)

Briefly, the macro in Figure 1 first checks to see whether WordPerfect's block mode is on. If it is, the macro jumps to the ENDF statement at the end. If not, it sets the variable VAR1 to match the character the cursor is on and sets VAR2 to the ASCII value of the character. If VAR2 is less than 97, which means it's an uppercase character (assuming it is an alphabetic character), the macro enters the lowercase equivalent; otherwise it enters the uppercase equivalent.

Last, the macro deletes the original character.

Note that this macro will have no effect at all on WordPerfect's special characters (available through Ctrl-W). Nor is it designed to deal with the high-order foreign language characters. For example, if you enter a lowercase ç (by turning on NumLock, holding the Alt key down, typing 135, and releasing the Alt key), and then run this macro, WordPerfect will replace the character with a Ç, but if you run the macro again, the character will not change back to ç. With other characters, such as â, running the macro once will change the character to an uppercase A, but it won't be the standard uppercase A. Rather, the character is defined as a special character, so running the macro again has no further effect.

The additional code in Figure 2 can stand as a macro by itself. This code also checks to see whether WordPerfect's block mode is on, and it executes the body of the macro only if this is the case. If block mode is on, the macro first checks to see if the variable that holds the current capitalization state—CharCap—exists. If not, it jumps to the label MakeUpperCase, sets CharCap to AllUpper, sets the block of text to uppercase, then goes to the end of the macro. If CharCap does exist, the macro uses the series of

```

IF(?BlockActive)
PERSISTALL
IF(Exists(CharCap)=0)
  Go(MakeUpperCase)
ENDIF
IF(CharCap="AllUpper")
  Go(MakeLowerCase)
ENDIF
IF(CharCap="AllLower")
  Go(MakeInitCap)
ENDIF
IF(CharCap="InitialCap")
  Go(MakeUpperCase)
ENDIF
LABEL(MakeUpperCase)
  ASSIGN(CharCap;"AllUpper")
  ConvertCaseUppercase
  GO(End)
LABEL(MakeLowerCase)
  ASSIGN(CharCap;"AllLower")
  ConvertCaseLowercase
  ConvertCaseLowercase
  GO(End)
LABEL(MakeInitCap)
  ASSIGN(CharCap;"InitialCap")
  ConvertCaseInitialCaps
  GO(End)
ENDIF
LABEL(End)

```



Figure 2: Use this macro to toggle a block of text between all uppercase, all lowercase, and mixed uppercase and lowercase with initial caps.

IF...ENDIF statements to test the current value of the variable, then goes to the appropriate label to set a new value for CharCap and set case for the block of text.

Note the PERSISTALL command, which tells WordPerfect that the CharCap variable should persist for the current session after the macro finishes. Note too that the macro gives the command ConvertCaseLowercase twice in the MakeLowerCase section of the macro. This is a workaround, because the underlying case change feature doesn't always convert all characters to lowercase when you give the command the first time. Finally, note that the first time you run the macro on any given block of text, the result may not be what you would expect, since the macro's behavior is based on the current state of the variable CharCap, rather than the current state of the text.

—M. David Stone

■ DATABASES

FoxPro's MSGBOX Function

How can I implement Windows-style message boxes within my FoxPro for Windows applications?

Mark Ramsey
New York, New York

► **PC MAGAZINE:** A Windows message box is a pop-up window that appears centered on the display. Usually the message box has a title in the caption bar, a message in the window, one or more buttons, and an icon. Users find them familiar since almost all Windows applications use message boxes for one reason or another.

The Windows API includes a MessageBox DLL function to display message boxes, but Microsoft provides a simpler alternative in the FOXTTOOLS.FLL library included with your copy of FoxPro for Windows. FOXTTOOLS is an add-on library (built using the library-construction kit) that provides you with a number of undocumented functions, including one called MSGBOX that fronts the Windows MessageBox function. You can use the MSGBOX function to call up Windows message boxes.

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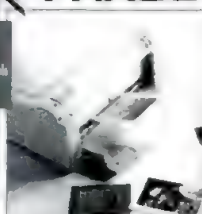
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Hit

You can also use other functions in Foxtools to register and call some Windows API functions directly, including MessageBox, but the Foxtools MSGBOX is the preferred function, because it is designed to work correctly within FoxPro's READ mechanism.

To use the MSGBOX function you must first activate the Foxtools library

using the SET LIBRARY TO command, like this:

```
SET LIBRARY TO SYS(2004) +
"FOXTOOLS.FLL" ADDITIVE
```

The SYS(2004) function returns the directory where FoxPro was started from, which is where Foxtools normally resides.

```
*****
* TRYBOX.PRG                                FoxPro for Windows 2.6
*****
```

```
*****
* Message Box support
*****
```

```
* Number and type of buttons
```

```
#define MB_OK                0                && 0x0000
#define MB_OKCANCE           1                && 0x0001
#define MB_ABORTRE           2                && 0x0002
#define MB_YESNOCA           3                && 0x0003
#define MB_YESNO             4                && 0x0004
#define MB_RETRYCA           5                && 0x0005
```

```
* Icon style
```

```
#define MB_NOICON            0                && 0x0000
#define MB_ICONHAN           16               && 0x0010
#define MB_ICONQUE           32               && 0x0020
#define MB_ICONEXC           48               && 0x0030
#define MB_ICONAST           64               && 0x0040
#define MB_ICONINF           MB_ICONAST
#define MB_ICONSTO           MB_ICONHAN
```

```
* Default button
```

```
#define MB_DEFBUT1           0                && 0x0000
#define MB_DEFBUT2           256              && 0x0100
#define MB_DEFBUT3           512              && 0x0200
```

```
* Dialog box type
```

```
#define MB_APPLMOD           0                && 0x0000
#define MB_SYSMOD            4096             && 0x1000
```

```
*****
* Standard dialog button IDs (values returned by MSGBOX)
*****
```

```
#define IDOK                 1                && 0x0001
#define IDCANCEL             2                && 0x0002
#define IDABORT              3                && 0x0003
#define IDRETRY              4                && 0x0004
#define IDIGNORE             5                && 0x0005
#define IDYES                6                && 0x0006
#define IDNO                 7                && 0x0007
```

```
SET LIBRARY TO SYS(2004)+"FOXTOOLS.FLL" ADDITIVE
```

```
cMsg = "Are You Sure You Want to Delete this Record? "
cTitle = "DELETE RECORD CONFIRMATION"
```

```
nAns = MSGBOX( cMsg, cTitle, MB_YESNOCA + MB_ICONQUE + MB_DEFBUT2 + ;
MB_SYSMOD)
```

```
DO CASE
```

```
CASE nAns = IDYES
```

```
WAIT WINDOW "You chose Yes, Record Deleted"
```

```
CASE nAns = IDNO
```

```
WAIT WINDOW "You chose No, Record was not deleted"
```

```
CASE nAns = IDCANCEL
```

```
WAIT WINDOW "You chose Cancel, Record was not deleted"
```

```
ENDCASE
```

```
RELEASE LIBRARY SYS(2004)+"FOXTOOLS.FLL"
```

```
RETURN
```



Figure 3: This sample program demonstrates using #DEFINE's and calling the MSGBOX function in FoxPro for Windows.

The ADDITIVE keyword adds Foxtools to the list of currently loaded libraries. If you don't include the ADDITIVE keyword, any existing libraries are unloaded before loading Foxtools, making their functions unavailable.

Once Foxtools is loaded, you can call the MSGBOX function, which takes three arguments. The first is the text of your message. The second is text to be displayed in the caption bar of the message box. And the third is a composite value that is composed of several numbers added together—each one a selection that you make to define the characteristics of the message box. To determine this value, you add together your selections from each of four groups. The first group defines the number and type of buttons, like this:

Number and type of buttons

```
-----
0 OK button only
1 OK and Cancel
2 Abort, Retry, and Ignore
3 Yes, No, and Cancel
4 Yes and No
5 Retry and Cancel
```

The second group lets you choose which icon to display in the message box:

Display Icon style

```
-----
0 No icon
16 Critical Message (Stop)
32 Query (Question Mark)
48 Warning (Exclamation Point)
64 Information (Large i)
```

The third group lets you select the default button (the one that will be pressed if you hit Enter or Spacebar):

Default button

```
-----
0 First
256 Second
512 Third
```

And finally, the fourth group lets you define what you can do when the message box is active, by choosing whether the message box is *application modal* or *system modal*.

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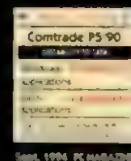
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Figure 4: You can create Windows message boxes like this one using FoxPro's MSGBOX function.

Application or system modal

0 Application modal

4096 System modal

Application modal means the user must respond to your message box before continuing in your application, but can switch to other applications or use Ctrl-Esc to call up the task switcher or Alt-Esc to switch between running applications. System modal means the user can do nothing except respond to the message box. Ctrl-Esc or Alt-Esc will not work. This is intended for very serious situations where an immediate response is needed, and as a general rule should never be used by your programs, except perhaps in extremely vertical applications.

For example, to display an application modal message box with a question mark icon and Yes, No, and Cancel buttons, with No as the default, you would call MSGBOX like this:

```
cAns = MSGBOX("Are You Sure?",
              "CONFIRM",
              3 + 32 + 256 + 0)
```

Note how the value in the third parameter is calculated from the values in the four groups (as detailed earlier).

You can use FoxPro's #DEFINE directive to give names to the values in the four groups. Figure 3 shows a sample program called TRYBOX that demonstrates using #DEFINE's and calling the MSGBOX function. The main advantage of using #DEFINE's is that you don't have to remember the values, just the names. Figure 4 shows the resulting message box.

Note that I used the same constant names as those defined in the official Windows SDK, but I truncated them at a length of ten characters because FoxPro

recognizes only the first ten characters.

If you use the MSGBOX function often in your application, you should load the FOX-TOOLS library once when your application starts and unload it only when it terminates to eliminate the overhead involved in loading and unloading the library often. The exception, of course, is when tight memory requirements dictate that the library be loaded only when it is used and discarded immediately.

The value returned by the MSGBOX function indicates the button that was chosen, as shown in the following table:

Value Button chosen

```
-----
1 OK
2 Cancel
3 Abort
4 Retry
5 Ignore
6 Yes
7 No
```

If the dialog box displays a Cancel button, pressing the Esc key has the same effect as choosing Cancel.

Normally MSGBOX automatically wraps your message text within the dialog box borders. To break lines manually you can insert carriage return/line feed combinations into your text like this:

```
"First line " +
CHR(13) + CHR(10) +
"Second line"
```

The TRYBOX.PRG file shown in Figure 3 can be downloaded from PC Mag-Net. Look in the Spreadsh/DBMS library in the Utilities/Tips Forum.

—Sal Ricciardi

GRAPHICS

Never the Twain Shall Meet

❓ I have a Ricoh RS311 flatbed scanner, and I use Picture Publisher's Paintbrush, Version 2, under Windows to capture images. My CONFIG.SYS file loads two de-

vice drivers for the scanner, both of which are stored in the Picture Publisher directory:

```
C:\windows\pubpb\richoh.sys
C:\windows\pubpb\scn8.com
```

I've often read about the benefits of Twain drivers. I'd like to use Twain to scan images directly into my application programs, instead of having to work through Picture Publisher. Both PageMaker 5.0 and Corel PhotoPaint 4 contain Twain Acquire commands, but when I try to use these functions, I am informed that there is no Twain path on my system.

Can you tell me more about Twain drivers, and how I can obtain the correct software?

Colin Franklin
New York, New York

► **PC MAGAZINE:** The Twain specification was jointly developed by a group of leading computer graphics companies: Aldus, Caere, Eastman Kodak, Hewlett-Packard, and Logitech. Twain provides a common interface for a wide variety of raster input devices, including scanners, video-frame grabbers, and digital cameras. Many different Windows-based graphics programs (such as Adobe Photoshop, Aldus PageMaker, Corel PhotoPaint, and Micrografx Picture Publisher) support the Twain protocol, which means you can scan images from within these (or any other Twain-compliant) application. Ultimately, however, the scanner manufacturer is responsible for writing a Twain driver for each particular hardware device in its product lineup.

Unfortunately, Twain is not a backward-compatible technology; it works only in conjunction with SCSI (Small Computer Systems Interface) devices. According to the technical support staff at Ricoh, your particular scanner uses a proprietary interface card and a bidirectional parallel connection. Since the scanner can't be upgraded to a SCSI connection, it can't be upgraded to the Twain interface. In short, in order to take advantage of a Twain scanner driver, you'll have to buy a new scanner.

—Luisa Simone



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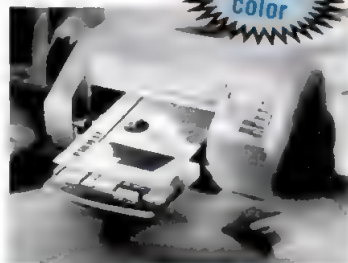
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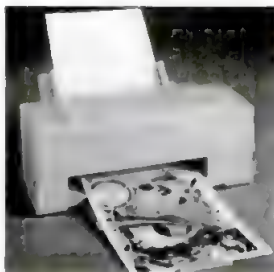
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	4.0/6.0 Mhz	175.00/286.00/500.00
Ambrs Pentium-01	4.0/6.0 Mhz	175.00/286.00/500.00
Ambrs K-4201	4.0/6.0 Mhz	175.00/286.00/500.00
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Ambrs SH Series	4.0/6.0 Mhz	175.00/286.00/500.00
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Ambrs N-75 N-100	4.0/6.0 Mhz	175.00/286.00/500.00

CYRIX DRx 386 to 486 Upgrade

	386	486
Single chip upgrade solution	386	486
Clock doubling solution	386	486
Compatible with industry standard 386/486 CPU socket	386	486
Compatible with DRAM, Windows, 3.1, OS/2 1.3 and 2.1	386	486
Cost industry standard 386/486	386	486
Easy to install—about 10 minutes	386	486

DIMM MODULES

	4MB	8MB	16MB	32MB	64MB	128MB
4MB	19.00	38.00	76.00	152.00	304.00	608.00

SIMM MODULES (Add \$5.00 for SIPP)

	1MB	2MB	4MB	8MB	16MB	32MB
1MB	19.00	38.00	76.00	152.00	304.00	608.00
2MB	19.00	38.00	76.00	152.00	304.00	608.00
4MB	19.00	38.00	76.00	152.00	304.00	608.00
8MB	19.00	38.00	76.00	152.00	304.00	608.00
16MB	19.00	38.00	76.00	152.00	304.00	608.00

72 PIN SIMMS (EISA)

	256	512	1024	2048	4096	8192
256	19.00	38.00	76.00	152.00	304.00	608.00
512	19.00	38.00	76.00	152.00	304.00	608.00
1024	19.00	38.00	76.00	152.00	304.00	608.00
2048	19.00	38.00	76.00	152.00	304.00	608.00
4096	19.00	38.00	76.00	152.00	304.00	608.00
8192	19.00	38.00	76.00	152.00	304.00	608.00

CYRIX FASMATH PROCESSOR

	83087-40MHz	83087-33MHz	83087-25MHz	83087-15MHz
83087-40MHz	79.00	79.00	79.00	79.00
83087-33MHz	79.00	79.00	79.00	79.00
83087-25MHz	79.00	79.00	79.00	79.00
83087-15MHz	79.00	79.00	79.00	79.00

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	1MB	2MB	4MB	8MB	16MB	32MB
1MB	19.00	38.00	76.00	152.00	304.00	608.00
2MB	19.00	38.00	76.00	152.00	304.00	608.00
4MB	19.00	38.00	76.00	152.00	304.00	608.00
8MB	19.00	38.00	76.00	152.00	304.00	608.00
16MB	19.00	38.00	76.00	152.00	304.00	608.00
32MB	19.00	38.00	76.00	152.00	304.00	608.00

ZENITH MEMORY MODULES

	1MB	2MB	4MB	8MB	16MB	32MB
1MB	19.00	38.00	76.00	152.00	304.00	608.00
2MB	19.00	38.00	76.00	152.00	304.00	608.00
4MB	19.00	38.00	76.00	152.00	304.00	608.00
8MB	19.00	38.00	76.00	152.00	304.00	608.00
16MB	19.00	38.00	76.00	152.00	304.00	608.00
32MB	19.00	38.00	76.00	152.00	304.00	608.00

MAGNAVOX

	1MB	2MB	4MB	8MB	16MB	32MB
1MB	19.00	38.00	76.00	152.00	304.00	608.00
2MB	19.00	38.00	76.00	152.00	304.00	608.00
4MB	19.00	38.00	76.00	152.00	304.00	608.00
8MB	19.00	38.00	76.00	152.00	304.00	608.00
16MB	19.00	38.00	76.00	152.00	304.00	608.00
32MB	19.00	38.00	76.00	152.00	304.00	608.00

MEMORY BOARDS

	16 BIT MEMORY BD FOR 286	386	486	586	686
16 BIT MEMORY BD FOR 286	19.00	38.00	76.00	152.00	304.00
386	19.00	38.00	76.00	152.00	304.00
486	19.00	38.00	76.00	152.00	304.00
586	19.00	38.00	76.00	152.00	304.00
686	19.00	38.00	76.00	152.00	304.00

LOCAL XT BUS

	1MB	2MB	4MB	8MB	16MB	32MB
1MB	19.00	38.00	76.00	152.00	304.00	608.00
2MB	19.00	38.00	76.00	152.00	304.00	608.00
4MB	19.00	38.00	76.00	152.00	304.00	608.00
8MB	19.00	38.00	76.00	152.00	304.00	608.00
16MB	19.00	38.00	76.00	152.00	304.00	608.00
32MB	19.00	38.00	76.00	152.00	304.00	608.00

IBM PSE 386XT EXPANSION BD.

	1MB	2MB	4MB	8MB	16MB	32MB
1MB	19.00	38.00	76.00	152.00	304.00	608.00
2MB	19.00	38.00	76.00	152.00	304.00	608.00
4MB	19.00	38.00	76.00	152.00	304.00	608.00
8MB	19.00	38.00	76.00	152.00	304.00	608.00
16MB	19.00	38.00	76.00	152.00	304.00	608.00
32MB	19.00	38.00	76.00	152.00	304.00	608.00

PS/2 MCA 0-8MB EXPANSION BD.

	1MB	2MB	4MB	8MB	16MB	32MB
1MB	19.00	38.00	76.00	152.00	304.00	608.00
2MB	19.00	38.00	76.00	152.00	304.00	608.00
4MB	19.00	38.00	76.00	152.00	304.00	608.00
8MB	19.00	38.00	76.00	152.00	304.00	608.00
16MB	19.00	38.00	76.00	152.00	304.00	608.00
32MB	19.00	38.00	76.00	152.00	304.00	608.00

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	286 (CPU)	486 (CPU)	486 (CPU)	486 (CPU)
286 (CPU)	19.00	38.00	76.00	152.00
486 (CPU)	19.00	38.00	76.00	152.00
486 (CPU)	19.00	38.00	76.00	152.00
486 (CPU)	19.00	38.00	76.00	152.00

IBM PS/1, PS/2 MEMORY MODULES

	1MB	2MB	4MB	8MB	16MB	32MB
1MB	19.00	38.00	76.00	152.00	304.00	608.00
2MB	19.00	38.00	76.00	152.00	304.00	608.00
4MB	19.00	38.00	76.00	152.00	304.00	608.00
8MB	19.00	38.00	76.00	152.00	304.00	608.00
16MB	19.00	38.00	76.00	152.00	304.00	608.00
32MB	19.00	38.00	76.00	152.00	304.00	608.00

IBM NOTEBOOK & LAPTOP MEMORY

	1MB	2MB	4MB	8MB	16MB	32MB
1MB	19.00	38.00	76.00	152.00	304.00	608.00
2MB	19.00	38.00	76.00	152.00	304.00	608.00
4MB	19.00	38.00	76.00	152.00	304.00	608.00
8MB	19.00	38.00	76.00	152.00	304.00	608.00
16MB	19.00	38.00	76.00	152.00	304.00	608.00
32MB	19.00	38.00	76.00	152.00	304.00	608.00

COMPAQ MEMORY MODULES

	1MB	2MB	4MB	8MB	16MB	32MB
1MB	19.00	38.00	76.00	152.00	304.00	608.00
2MB	19.00	38.00	76.00	152.00	304.00	608.00
4MB	19.00	38.00	76.00	152.00	304.00	608.00
8MB	19.00	38.00	76.00	152.00	304.00	608.00
16MB	19.00	38.00	76.00	152.00	304.00	608.00
32MB	19.00	38.00	76.00	152.00	304.00	608.00

COMPAQ LAPTOPS & NOTEBOOKS

	1MB	2MB	4MB	8MB	16MB	32MB
1MB	19.00	38.00	76.00	152.00	304.00	608.00
2MB	19.00	38.00	76.00	152.00	304.00	608.00
4MB	19.00	38.00	76.00	152.00	304.00	608.00
8MB	19.00	38.00	76.00	152.00	304.00	608.00
16MB	19.00	38.00	76.00	152.00	304.00	608.00
32MB	19.00	38.00	76.00	152.00	304.00	608.00

TOSHIBA LAPTOP MEMORY

	1MB	2MB	4MB	8MB	16MB	32MB
1MB	19.00	38.00	76.00	152.00	304.00	608.00
2MB	19.00	38.00	76.00	152.00	304.00	608.00
4MB	19.00	38.00	76.00	152.00	304.00	608.00
8MB	19.00	38.00	76.00	152.00	304.00	608.00
16MB	19.00	38.00	76.00	152.00	304.00	608.00
32MB	19.00	38.00	76.00	152.00	304.00	608.00

NOTEBOOK, LAPTOP MEMORY

	1MB	2MB	4MB	8MB	16MB	32MB
1MB	19.00	38.00	76.00	152.00	304.00	608.00
2MB	19.00	38.00	76.00	152.00	304.00	608.00
4MB	19.00	38.00	76.00	152.00	304.00	608.00
8MB	19.00	38.00	76.00	152.00	304.00	608.00
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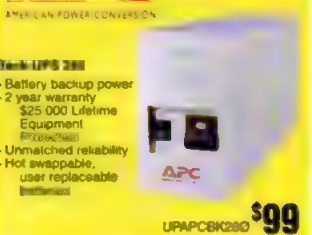
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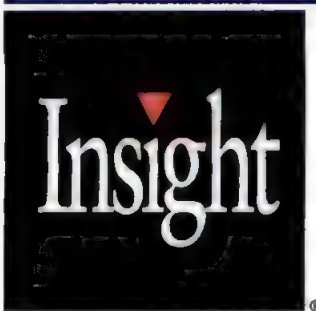
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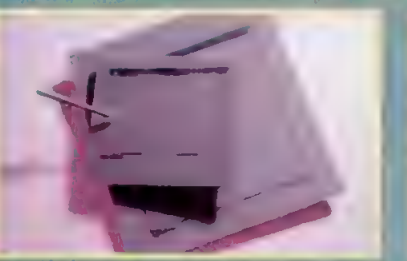
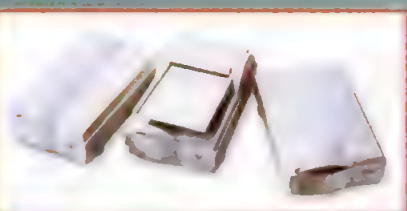
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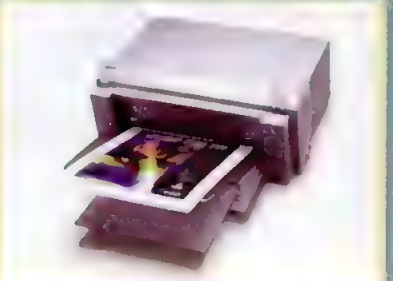
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This advanced, dual-function dye-sublimation/wax thermal transfer color printer delivers incredible 600 x 300 dpi, photo quality output. PrimeraPro also offers laser-quality text, LocalTalk® or parallel interfaces, and optional Adobe® PostScript® Level 2. But besides color printing, PrimeraPro is also ideal for standard monochrome text output. With this level of resolution, and a new flat black monochrome ribbon along with plain laser paper, it's also a great printer for desktop publishing, word processing, virtually any other task you give it.

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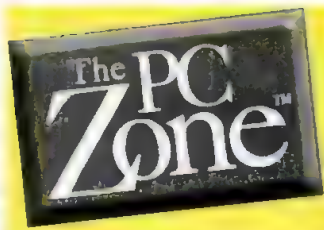
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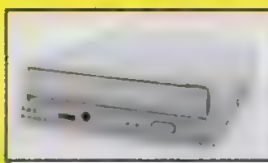
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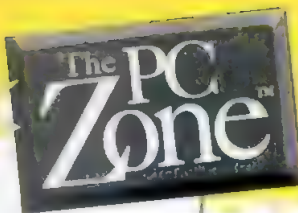
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	Sound Card	\$349.99
19260	Crescendo	\$269.99
19313	Tropaz	\$219.99
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Fujitsu		
20208	DynaMO 230mb Ext MO Drive	\$479.99
NEC		
19729	2V Deluxe CD-ROM Dr	\$297.99
19727	2Vi CD-ROM Drive	\$179.99
19730	3Xp Plus CD-ROM Drive Grey	\$379.99
19724	4Xe CD-ROM Drive	\$499.99
19723	4Xi CD-ROM Drive	\$399.99
Pioneer		
19278	4Plex Quad CD-ROM w SCSI Card	\$549.99
19258	4Plex Quad Speed CD-ROM Int	\$489.99
Sony		
19315	CDU-55s Int IDE CD-ROM Drive	\$129.99
17890	CDU-55s Int SCSI CD-ROM Drive	\$219.99
20650	CDU-75 Ext CD-ROM	\$279.99

Digitizers, Scanners		
Karta		
19790	XGT 6x8 PC w/Visual Tab SW 48 curs	\$294.99
19788	XGT 6x8 Serial Graphics Tablet	\$294.99
Hewlett-Packard		
92609	3p	\$499.99
92602	1lxc	\$994.99
Microtek		
13175	ScanMaker IHR	\$1,059.99
13175	ScanMaker IHP	\$749.99
17891	ScanMaker IHPX	\$999.99
11931	ScanMaker II	\$499.99
Nikon Electronic Image		
19330	COOLSCAN External	\$1,999.99
Relays		
12929	Avec Colour 2400 Designer w/P/shop LE	\$499.99
14381	2412T PC Scanner w/Photoshop Full	\$1,169.99
17868	9624 PC/T Scanner w/Photoshop Full	\$1,949.99
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13417	UC 1260 Pro Scanners w/Photoshop	\$1,099.99
14377	UC 630LE Scanners w/Photoshop LE	\$599.99
21429	Vista S-8 Scanner	\$899.99
17894	Vista S-6 Scanners w/Photoshop LE	\$749.99
Wacom		
21243	Artz Ed Serial/Painter 3	\$649.99
14026	Art 2 Serial Graphics Tablet	\$379.99
17940	ArtPad 4x5 Graphics Tablet	\$159.99
14713	UD-1212R Tablet w/ Ultra Pen	\$539.99

Monitors, Video Products		
ATI		
19906	Graphics Pro Turbo 2MB	\$389.99
19907	Graphics Pro Turbo 4MB	\$595.99
19908	Graphics Xpression 1MB	\$155.99
19910	Graphics Xpression 2MB	\$209.99
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18245	SpeedStar Pro 1MB DRAM VLB	\$124.99
18484	SpeedStar Pro 1MB DRAM ISA	\$194.99
18489	SpeedStar 4MB DRAM	\$347.99
18490	SpeedStar 4MB DRAM	\$549.99
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18386	HERCULES GRAPHITE 2MB	\$369.99
18385	HERCULES GRAPHITE PRO 1MB	\$234.99
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21391	Innovation MX145 15"	\$449.99
21392	Innovation MX155 15"	\$459.99
21395	Innovation MXP17 17"	\$899.99
NEC		
19717	XE15 15"	\$549.99
99801	3FG 15"	\$547.99
99990	5FG 17"	\$999.99
19718	XE17 17"	\$999.99
19719	XE21 21"	\$1,999.99
19720	XP15 15"	\$619.99
19721	XP17 17"	\$1,249.99
19722	XP21 21"	\$2,499.99
Orchid Technology		
19923	Fahrenheit 64 1Mb Dram	\$155.99
19927	Fahrenheit Pro64 2Mb Dram	\$229.99
18816	Kelvin 64 1Mb Dram	\$145.99
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18810	Kelvin EZ/VLB 1MB Dram	\$124.99
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18509	1000S-14" Super VGA Cir Monitor	\$299.99
20184	1562A 15" Color Monitor	\$369.99
Sony		
01156	Multiscan 15st Monitor	\$449.99
02140	Multiscan 175F	\$379.99
01157	Multiscan 20SE Monitor	\$1,894.99
Viewsonic		
17514	ViewSonic 21" VGA Monitor	\$2,109.99
16160	ViewSonic 6E NI Monitor	\$385.99

Computers		
AST		
21670	Bravo MS-T Pentium 90MHz 1GB/16	\$3,699.99
21671	Bravo MS-T Pentium 90MHz 540/8	\$2,399.99
21672	Bravo MS-T 486DX2 66MHz 540/8	\$1,799.99
21673	Bravo MS Pentium 60MHz 730/16	\$2,799.99
21674	Bravo 486DX4 100MHz 540/8	\$2,699.99
NEC		
19706	PowerMate 486DX2-66 420HD 4MB	\$1,299.99
19708	PowerMate 486DX4-100 420HD 8MB	\$1,749.99
19709	PowerMate Pentium-60 420HD 8MB	\$1,849.99
19704	Ready P60M SWS-60 420HD 8MB	\$2,149.99
Packard Bell		
18542	Force 101CD	\$1,999.99
18544	Force 103CDT	\$2,549.99
18536	Force 50CD	\$1,279.99
18540	Force 56CD	\$1,649.99

Notebooks		
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19072	Ascenta 900N 486DX2-50 340 4MB	\$3,244.99
19074	Ascenta 900N 486DX4-75 340 8MB	\$3,299.99
Leading Edge		
19184	Aviva 2000 NB 2530 486/50 340/4	\$2,199.99
19185	Aviva 2000 NB 2730 486/100 340/4	\$2,699.99
19186	Aviva 2000 NB 2750 486/100 340/4	\$3,699.99
NEC		
13129	Versa S-486SX-33 210HD 4Mb	\$1,499.99
19711	Versa V-486DX2-50 250HD 4Mb	\$2,699.99
Texas Instruments		
13671	TravelMate 4000C 486DX4-75 340 4MB	\$3,499.99
19098	TravelMate 4000M DX4-100 524 4Mb	\$5,399.99
Toshiba		
19131	2400CS 486DX2/50 250HD 4MB	\$2,674.99
19132	2400CT 486DX2/50 250HD 8Mb	\$3,595.99
19143	4900CT Pentium 722Hz 8Mb	\$8,345.99
19136	11960CT 486DX2/50 320HD 4Mb	\$2,835.99
19137	13600CT 486DX2/50 250HD 8Mb	\$3,785.99
19100	16600C 486DX2 66 510HD 8Mb	\$6,059.99

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Canon		
19893	BJC-4000	\$449.99
13668	BJC-600	\$475.99
19855	BJC-800	\$1,499.99
Epson		
17861	Action 1100	\$399.99
17842	Action 1500	\$479.99
19294	Action 600	\$799.99
17840	Stylus 300	\$199.99
17841	Stylus 800+	\$223.99
19270	Stylus Color	\$599.99
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20187	DeskJet 1200C	\$1,459.99
13686	DeskJet 500C	\$499.99
21154	LaserJet 4	\$1,477.99
21150	LaserJet 4L	\$989.99
21155	LaserJet 4M	\$1,997.99
21151	LaserJet 4ML	\$1,826.99
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21157	LaserJet 4SI MX	\$4,234.99
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19854	4039 10Pin	\$1,299.99
18549	ExecJet IIC	\$319.99
19856	ValueWriter 300	\$679.99
19857	ValueWriter 600	\$814.99
19853	WinWriter 200	\$475.99

NEC		
13110	Super Script 610	\$424.99
Olivetti		
19486	OL400s	\$429.99

93889	OL410/PS	\$779.99
21052	Pacemarc 3410	\$1,449.99
Panasonic		
17827	P 2130	\$299.99
17821	P1150	\$135.99
17818	P4400	\$469.99
17819	PS400	\$489.99
20153	SP100	\$829.99

Star Micronics		
93862	SJ 144 Full Color Printers-PC	\$299.99
Texas Instruments		
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19899	Ti MicroLaser PowerPro	\$1,649.99
14319	Ti MicroLaser Pro 600 PS23	\$1,109.99
06860	Ti microWriter PS65	\$799.99

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16209	Adaptec AHA-2742AT EISA SCSI Mstr II	\$319.99
16223	Adaptec AHA-1542CF SCSI Master	\$224.99
Conner		
14602	CFA340 343MB IDE Int HD 13MS	\$299.99
14626	CFS420A-426MB/IDE-Int HD 14MS	\$269.99
14633	CFA340 343MB IDE Int HD 13MS	\$299.99



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- ▲ Integrated trackball
- ▲ 2 Type II or 1 Type III PCMCIA slot
- ▲ MS-DOS, Windows for Workgroups, Indeo Video
- ▲ 3-Year Warranty

Processor	RAM	Screen	Hard Drive	Price
486DX2 50	4MB	10.3" Dual Scan	200MB	\$2759
486DX2/50	4MB	10.3" Dual Scan	340MB	2969
486DX2 50	4MB	9.5" Active	340MB	4099
486DX2/50	8MB	9.5" Active	450MB	4419
486DX4/75	8MB	9.5" Active	520MB	4989
486DX4/100	4MB	10.3" Dual Scan	700MB	4099

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Processor	RAM	Screen	Hard Drive	Price
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486DX2/50	4MB	9.5" Dual Scan	200MB	2129
486DX2/50	8MB	9.5" Dual Scan	340MB	2459
486DX2/50	4MB	9.5" Active	340MB	3069

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Processor	Screen	Hard Drive	Price
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486DX2 50	10.3" Dual Scan	340MB	3349
486DX2 50	10.3" Dual Scan	520MB	3729
486DX2/50	10.4" Active	340MB	4459
486DX2 50	10.4" Active	520MB	4839
486DX4/100	10.3" Dual Scan	340MB	4069
486DX4/100	10.3" Dual Scan	520MB	4449
486DX4/100	10.4" Active	340MB	5179
486DX4/100	10.4" Active	520MB	5559

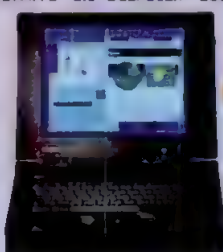
HP OmniBook Notebook PCs 600 Series

Processor	Screen	Hard Drive	Price
486DX2/50	8.5" Dual Scan	170MB	\$2549
486DX2/50	8.5" Dual Scan	260MB	2829
486DX4/75	8.5" Dual Scan	170 MB	3099
486DX4/75	8.5" Dual Scan	260MB	3379

HP DeskJet 320		\$299.99
HP DeskJet 320 w/Sheet Feeder		359.99
HP DeskJet 540		289.99
HP DeskJet 560C		479.99
HP DeskJet 1200C		999.99
HP DeskWriter 320		299.99
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HP DeskWriter 560C		479.99
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T1910	486SX/33	9.5" Dual Scan	200MB	1779
T1960	486DX2/50	9.5" Dual Scan	200MB	2159
T1960	486DX2/50	9.5" Dual Scan	320MB	2329
T1960	486DX2/50	8.4" Active	200MB	2629
T1960	486DX2/50	8.4" Active	320MB	2799
T2400	486DX2/50	9.5" Dual Scan	250MB	2469
T2400	486DX2/50	9.5" Dual Scan	320MB	2629
T2400	486DX2/50	8.4" Active	250MB	2959
T2400	486DX2/50	8.4" Active	320MB	3219
T2450CT	486DX4/75	9.5" Active	320MB	4239
T2450CT	486DX4/75	9.5" Active	500MB	4529

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T4800	486DX4/75	9.5" Active	500MB	4799
T4850	486DX4/75	10.4" Active	500MB	5199
T4850	486DX4/75	10.4" Active	772MB	5569

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- ▲ 3-Year Warranty

Model	RAM	Hard Drive
486DX2/66	8MB	540MB
486DX2/66	4MB	540MB
486DX2/66	8MB	540MB
Pentium 75MHz	8MB	540MB
Pentium 75MHz	8MB	1GB
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Ascentia 900N

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- ▲ 4MB/8MB RAM exp. to 32MB
- ▲ 2 Type II or 1 Type III PCMCIA slot

Model	Screen	Hard Drive	Price
4/50 Model 343W	10.3" Dual Scan	340MB	\$2719
4/50 Model 343W	9.5" Active	340MB	3629
4/75 Model 343W	10.3" Dual Scan	340MB	3219
4/75 Model 513W	10.4" Active	510MB	4999

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Ascentia 900N



Ascentia 810N

- ▲ LARGE, 10.4" Dual Scan displays
- ▲ 4MB RAM expandable to 20MB
- ▲ Removable hard drive and floppy drive
- ▲ 2 Type II or 1 Type III PCMCIA slot

Model	Screen	Hard Drive	Price
486DX2/66	10.4 Dual Scan	250MB	\$2399
486DX2/66	10.4 Dual Scan	340MB	2539
486DX2/66	10.4 Dual Scan	510MB	2639

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The Multimedia Standard

Packard Bell

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Model	RAM	Hard Drive	Price
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Pentium 90MHz	8MB	540MB	2199
Pentium 90MHz	8MB	810MB	2599
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- ▲ 2 Type II or 1 Type III PCMCIA slot
- ▲ TrackPoint II pointing device
- ▲ IBM DOS 6.3, Windows 3.1 and 8 FREE software titles
- ▲ Port Replicator and Docking Station available

Processor	Screen	Hard Drive	Price
486SL/33	9.5" Dual Scan	170MB	\$2199*
486SL/33	9.5" Dual Scan	340MB	2659
486SL/33	8.4" Active	170MB	2489
486SL/33	8.4" Active	340MB	2779
486DX2/50	9.5" Dual Scan	340MB	2889
486DX2/50	9.5" Dual Scan	540MB	3259
486DX2/50	8.4" Active	340MB	3299
486DX2/50	8.4" Active	540MB	3639

* Includes FREE carrying case

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ThinkPad® 510 Subnotebook

- ▲ IBM 486BL2/50 processor
- ▲ 4MB RAM exp. to 20MB
- ▲ 200MB hard drive
- ▲ 7.7" color display
- ▲ Type II PCMCIA slot
- ▲ TrackPoint II integrated pointing device
- ▲ 3.5" external floppy drive
- ▲ Weighs only 4.0 lbs.
- ▲ IBM DOS 6.3, Windows 3.1, Lotus cc:Mail, Organizer, ScreenCam, Official Airline Guide FlightDisk, CoSessions Host, Prodigy, America Online, and FaxWorks 3.0

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486DX4/100	10.4" Dual Scan	340MB	\$ 4739
486DX4/100	10.4" Dual Scan	540MB	5129
486DX4/100	10.4" Dual Scan	810MB	5659
486DX4/100	10.4" Active	340MB	6049
486DX4/100	10.4" Active	540MB	6429
486DX4/100	10.4" Active	810MB	6959
486DX4/100	10.4" Active	540MB	7349
486DX4/100	10.4" Active	810MB	7879

* 755CD features BUILT-IN CD-ROM Drive

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 - MS-DOS & Windows for Workgroups
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- 730MB 12ms IDE hard drive
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- 15" PerComp™, 1280NI, .28dp
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- 730MB 12ms IDE hard drive
- 1MB graphics accelerator
- 15" PerComp™, 1280NI, .28dp

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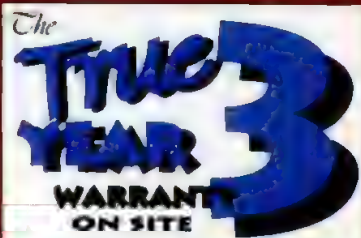
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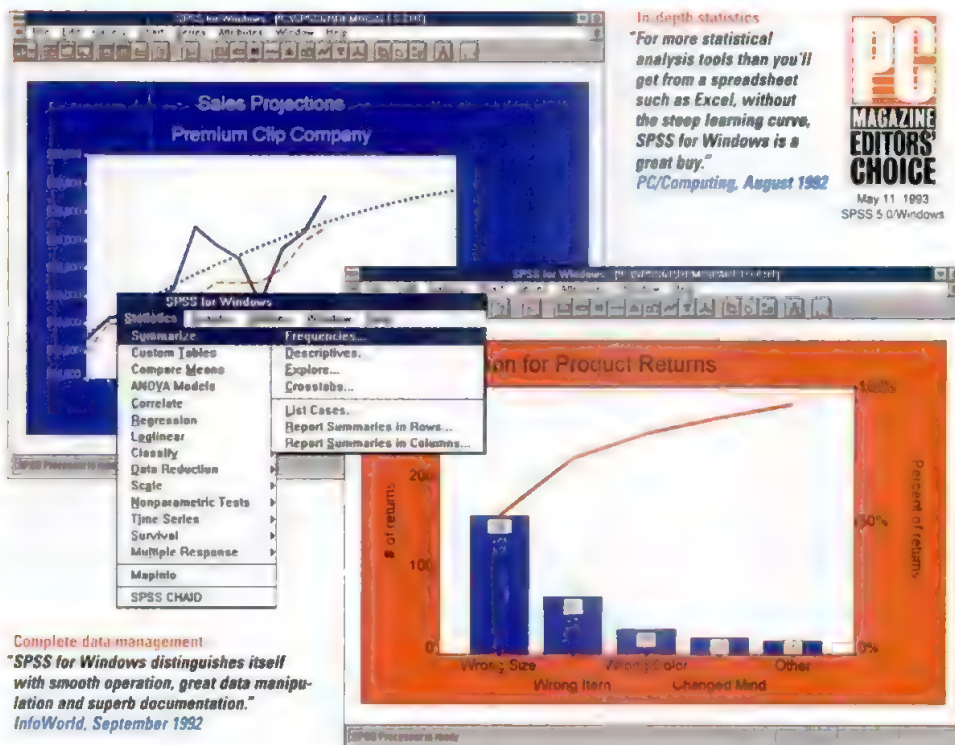
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Introducing two revolutionary new products from Samsung: the NoteMaster™ S3945T notebook and the SENS Lite 200 subnotebook computers. Designed from the ground up, these are solid pieces of equipment. The components have all been configured to work together for maximum comfort, power, efficiency and value, to work as an extension of you.

You will also appreciate the peace of mind. Samsung's exclusive Executive Support Program (ESP) is yours free for the first year. Simply call the ESP toll-free hotline and your NoteMaster will be repaired within 24 hours and returned to you via Priority Air freight at no extra cost. Additionally, you receive a 30-day money-back guarantee, a 2 year limited warranty and lifetime toll-free technical support. Call and order a NoteMaster today!

A woman with blonde hair, wearing a red blazer, is sitting at a desk. She is looking down at a laptop computer with her right hand on the keyboard. In her left hand, she holds a blue mobile phone. The desk is cluttered with papers and other office supplies. The background is dark and out of focus.

Things that work
together—that's what I
like. And when it's at a
price like this NoteMaster
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Genuine Samsung display features brilliant 9.4" color DSTN or color TFT LCD full-size 80 column 25line 640x480 resolution with 1MB video RAM and local bus video/GUI accelerator.

Simultaneous LCD and CRT display capability.

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A 3.5", 1.44MB floppy drive and a removable hard drive in your choice of storage capabilities: 340, 520, or 732MB.



NiMH batteries operate up to 3 hours with a quick re-charging time of 2 hours. A free voltage adapter: 100V-250V included.

Port interface: parallel, serial, external monitor, external keyboard/key-pad and CableMaster (120 pins).

NoteMaster™ S3945T Easy on your wallet.

S3945T, DX2/50, DSTN, 170MB HDD, 4MB RAM	\$1,999
S3945T, DX2/50, DSTN, 340MB HDD, 4MB RAM	\$2,299
S3945T, DX4/75, DSTN, 520MB HDD, 4MB RAM	\$2,799
S3945T, DX2/50, TFT, 340MB HDD, 4MB RAM	\$2,899
S3945T, DX4/75, TFT, 520MB HDD, 8MB RAM	\$3,648
S3945T, DX4/75, TFT, 732MB HDD, 8MB RAM	\$3,848

The most comfortable keyboard layout available! A built-in wrist rest and track-ball intuitively placed for the ultimate ease of use.

No more fumbling with PCMCIA cards. Two PCMCIA slots—one type-I or type-II and one type-III can be used *simultaneously*. A unique feature not found in other notebooks!

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Work-hungry Intel® 80486DX2/50 or DX4/75 microprocessors.

SENSLite™ 200 Easy on your wallet.

S200, DX2/50, DSTN, 260MB HDD, 4MB RAM, EXT FDD	\$1,999
S200, DX4/75, DSTN, 520MB HDD, 4MB RAM, EXT FDD	\$2,599
S200, DX2/50, TFT, 340MB HDD, 4MB RAM, EXT FDD	\$2,799
S200, DX4/75, TFT, 520MB HDD, 8MB RAM, EXT FDD	\$3,499

A removable 12.7mm high, 2.5" wide hard drive, in your choice of storage capacities: 260, 340 or 520MB.

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Port interface: parallel, serial, CableMaster (120 pins) and external speaker jack.

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The NoteMaster and SENSLite both come with:

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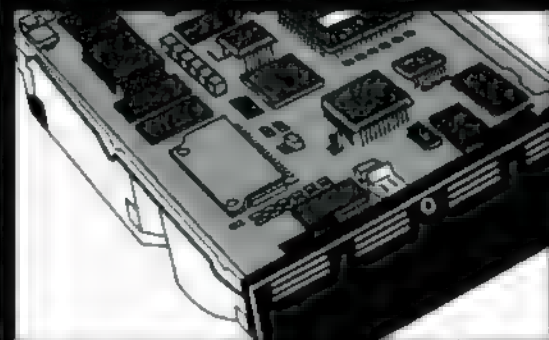
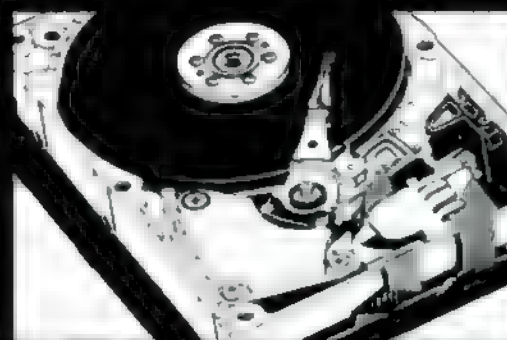
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9100MB	12ms	5400rpm	MC1991	\$3199

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850MB	CONNER	2yr	\$282	\$429

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541MB	11ms	LT540A	\$235
731MB	11ms	LT730A	\$275

SCSI			
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540MB	14ms	MV540S	\$242
541MB	11ms	LT540S	\$245
731MB	11ms	LT730S	\$290
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270MB	SQ3270S	\$369	\$519
IDE	Drive	PC Kit	Portable
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270MB	SQ3270A	\$339	\$439
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Mitsumi	CRMCFX400	4X 230ms	\$225

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Plextor 4X CS	\$819	\$1689	\$2879

SCSI TAPE DRIVES

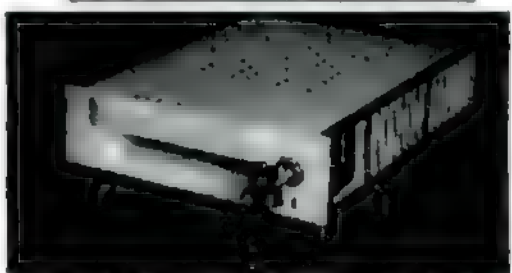
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4-8Gig	HP	35480	\$869
4-10Gig	Conner	4326	\$959
4-10Gig	HP	C1533A	\$1049
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Novell NLM 50 user / unlimited / OS/2			\$199 / \$339
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Retrospect for Mac (w/drive only) / DESKTAPE MAC			\$129/\$279
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A1542COREL 16Bit SCSI	\$235	\$225
A2742 EISA SCSI	\$379	\$369
A2842 VESA SCSI	\$259	\$249
A2940Kit PCI SCSI	\$299	\$289
Future Domain 1680 16Bit SCSI	\$134	\$119
QLOGIC PCI SCSI & WIDE	\$325	\$315
TEKRAM CACHING CARDS		
DC600CF 16Bit IDE	\$89	\$79
DC680C 32Bit Local Bus IDE	\$109	\$99
DC690C 32Bit PCI IDE	\$149	\$139
SCSI Controllers include COREL SCSI		
DC800B 16Bit SCSI	\$199	\$189
DC880B 32Bit Local Bus SCSI	\$299	\$289
TEKRAM NON-CACHING		
DC300B 16Bit SCSI w/ Corel	\$159	\$149
DC380B VESA SCSI w/ Corel	\$179	\$160
DC290N PCI Enhanced IDE	\$45	\$39
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7540	540MB	11MB	3.5 IDE	220

2 Year Warranty CONNER

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CF240A	420MB	12MB	3.5 IDE	179
CF2125	1.27GB	10MB	3.5 IDE	400

2 Year Warranty Seagate

MODEL	SIZE	SPEED	TYPE	PRICE
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3 Year Warranty WESTERN DIGITAL

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2420	425MB	12MB	3.5 IDE	180
2540	540MB	12MB	3.5 IDE	230
2700	700MB	10MB	3.5 IDE	280
AC3100	1GB	10MB	3.5 IDE	430

2 Year Warranty Quantum

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CONNER	CF34A05	340mg	12MB	190
CONNER	CF11A05	1.06GB	9MB	550

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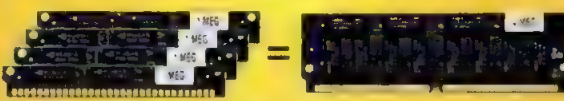
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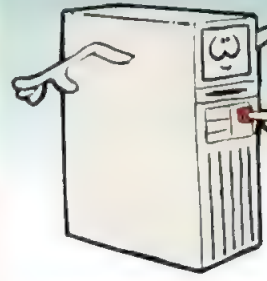
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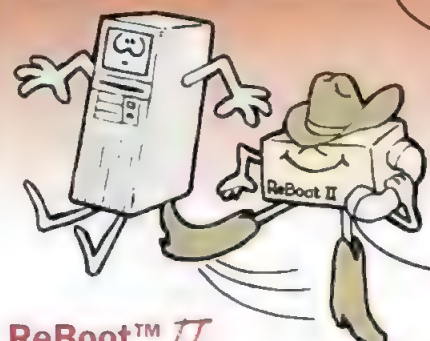
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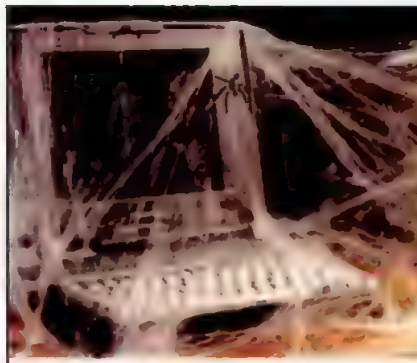


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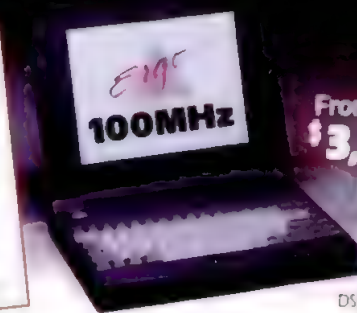
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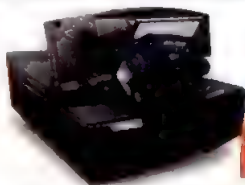
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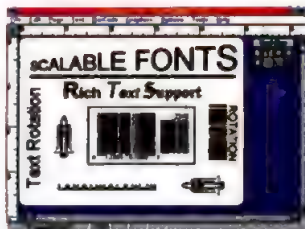
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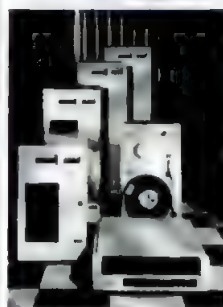
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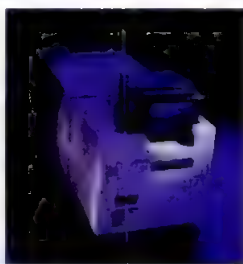
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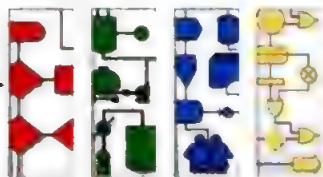
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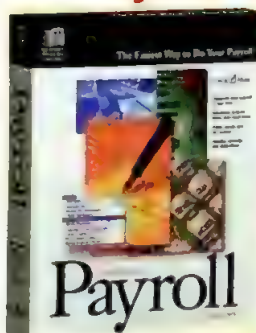
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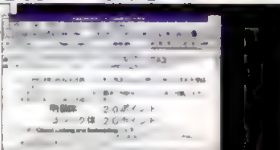
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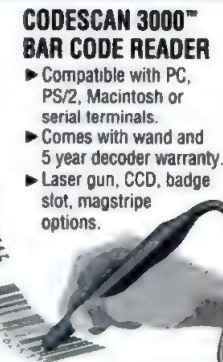
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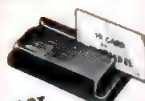
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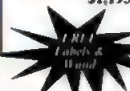
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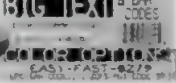
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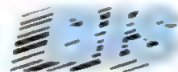
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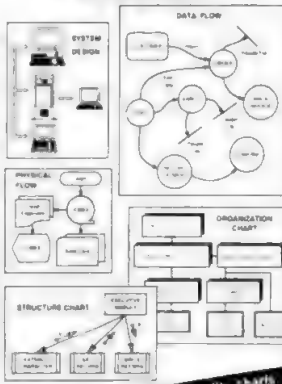
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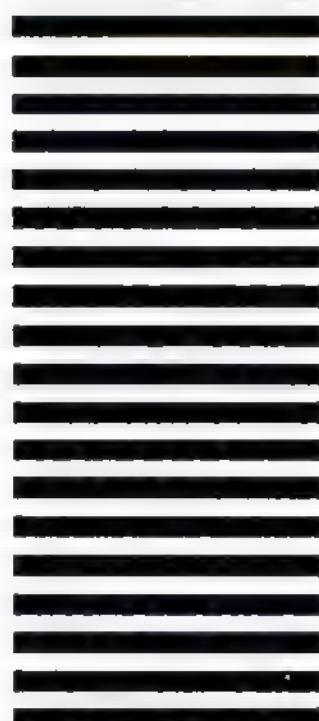
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02. ☐ In 4 to 6 months 04. ☐ No definite plans

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01. ☐ 25 or less 03. ☐ 100-499 05. ☐ 1000
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8. Do you plan to buy any PC products?

01. ☐ Now 03. ☐ In 7 to 12 months
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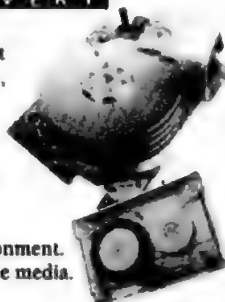
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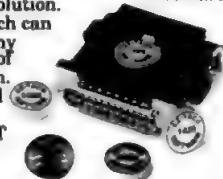
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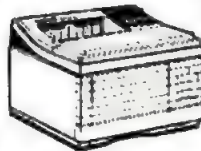
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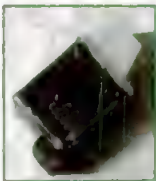
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Coming Up

Multimedia à la Carte

If you've been putting off climbing onto the multimedia bandwagon, you're in luck. In our next issue, *PC Magazine* delivers a comprehensive look at the components that turn a workaday PC into a sound-and-video extravaganza. While many buyers opt for upgrade kits, where everything you need is put together for you in one box, there are still advantages to buying the components singly. First and foremost, you can mix and match the best CD-ROM drive, sound board, and speakers for your purposes instead of relying on someone else's idea of what you need.

CD-ROM DRIVES To quad-speed or not to quad-speed? The performance of quadruple-speed drives is enticing, but so are the low prices of the double-speed units—as low as \$149. We review 10 quad-speed, 1 triple-speed, and 19 double-speed drives so you can compare features and performance. Is an inexpensive double-speed suitable for you, or should you opt for a faster unit?

SOUND BOARDS Bringing good sound to your PC is getting cheaper and easier, with prices as low as \$69.99 and more user-friendly installation. ZD Labs put 30 sound cards through an extensive suite of tests to gauge playback and recording prowess. We tell which are the right boards for business users, which are ideal for games and edutainment, and which are good enough for multimedia authoring—as well as which ones to avoid. We also look at the new breed of card that combines audio functions and a modem on a single board. Is it better for the business user?

SPEAKERS The traditional Achilles' heel of a multimedia system, speakers are often an afterthought for kit makers and MPC vendors. But without a good pair of powered speakers, even an expensive sound board will sound disappointing. We home in on the best PC speakers so you can do justice to your investment.

Workgroup File Servers

For network sites with fewer than two dozen users, a file server's ease of setup, operation, and maintenance may be more critical than its raw performance. You can't expect that any old PC with a network interface card will provide the amenities offered by machines designed from the ground up to be workgroup servers. We test seven file servers running NetWare 3.12 to see how they balance performance, price, and usability for your workgroup.

Moving Messages

The multitasking model used by 16-bit Windows is not optimal: If an ill-behaved application runs too long without checking for messages, other apps stop in their tracks. But our next Power Programming column shows you how easy it is to turn a piggish program into a smooth multitasker by adding just a few lines of code.

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After Hours

EDITOR'S RATINGS: ★ Poor ★★ Fair ★★★ Good ★★★★ Excellent

CD-ROM

Windows

CD-ROM

Resource-Intensive

Adult Content

Kids (Ages)

Price

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Armored Fist

NovaLogic Inc., 818-774-0600.

Circle 525 on reader service card

★★★★ CD-ROM

Enemy tanks line the hills all around you, you just spotted an inbound attack helicopter, and your whole platoon is running out of ammo. Now might be a good time to call in that air support you were promised....

In *Armored Fist*, NovaLogic's new tank-combat simulation, you'll face challenges like this on every mission. *Armored Fist* places you in command of up to 16 armored vehicles for either Western or Eastern forces.

Thanks to the breathtaking 3-D graphics engine—the same one used in NovaLogic's *Comanche* helicopter sim—*Armored Fist* makes every



Breathtaking 3-D graphics combine with heart-stopping missions in NovaLogic's tank-combat simulation, *Armored Fist*.

shot seem real. Excellent effects, such as translucent smoke that pours from damaged vehicles and beautifully rendered cut scenes, add to the realism.

You can fight individual battles or entire campaigns in six locations from Bosnia to the Middle East. More than 50 prebuilt missions are included, but if that's not enough, you can build your own using *Armored Fist*'s mission editor, which lets you design entire scenarios from the ground up.

Once you select a mission or campaign, get ready for instant anxiety. Almost every mission starts out with your tank already in the enemy's gunsights, so you have to think and act quickly. Controlling your tanks is fairly easy, though only an octopus could follow the manual's suggestion that you try using the keyboard, the mouse, and

the joystick together.

Still, the stunning graphics, customizable missions, and the fast-paced action place *Armored Fist* in a simulated platoon by itself.

—Michael Ryan

Master of Magic

Microprose, 410-771-1151.

Circle 526 on reader service card

★★★★ CD-ROM

Master of Magic is Microprose's *Civilization* with a magic edge. In this turn-based strategy simulation, you match your society-building and wizardly skills against two or more computer-driven opponents.

Each wizard begins with basic knowledge of the world's magic disciplines; with time and effort, the wizard acquires a selection of the game's unique spells. Each wizard has a basic personality and talents (such as Arch-

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After Hours

mage, Warlord, and Rune-master) that grant him distinct advantages. The game comes with 14 predefined wizards, and you can create your own.

There are plenty of randomized elements to please ardent game fans. You can add up to 35 building types and 42 different military units to each city you own. The building types available depend on which of 14 races

Wolf

Sanctuary Woods, 415-286-6000.

Circle 527 on reader service card

★★★    \$49.95

Wolf is a role-playing simulation the way SimCity was a strategy simulation; both virtually redefine their respective genres. But here, instead of running a fictional city, you're running with the wolves. Literally.

Wolf looks much like many other role-playing games: An overhead view shows your wolf in your choice of terrain and your fellow living creatures, such as skittish deer and stupid cows. An occasional bald eagle soars overhead and fellow packmates sniff at you in greeting. Your wolf can run, walk, sleep, drink, eat, and, of course, howl and bark. But it's actually living as a wolf that makes Wolf addictive—and life as a wolf is hard. Wolf lets you play out

different scenarios, from the simple—killing a hare or finding water—to the difficult—mating with a wolf of the opposite sex.

You can even play in a campaign mode where your wolf lives in a pack and tries to become the “alpha,” or top dog, while grappling with everyday survival. Bad weather, problematic terrain, and scarce game all are walks in the park compared to man; eluding rifles and helicopters proves to be your biggest challenge. Even the simplest scenarios, such as dodging hunters and finding water, are difficult, which says something about the difficulty of the game but also the difficulty of being a wolf.

A portion of the proceeds from the game are donated to wolf conservation groups that have ensured that these digital wolves are true to their mammalian models. Play this game for a while and you'll



Sanctuary Woods' Wolf lets you play leader of the pack as you struggle for survival.

lose yourself in it, but you'll gain a new respect for life in the wild.

—Bernard H. Yee

Wing Commander Armada

Origin Systems, 512-335-5200.

Circle 528 on reader service card

★★★    \$60

The Kilrathi are back, but this time you can be on their side. That's one of the new features in Origin's Wing Commander Armada, the fifth entry in the highly successful Wing Commander series and the last to be based on strategy simulation.

The first Wing Commander title to support head-to-head play, Armada sports



Build a magical town and manage your wizards in Microprose's Master of Magic.

of characters is in control. Potential hero types join your quest if you acquire renown or free them from dungeons and towers. They possess a variety of skills and may wield any of the hundreds of magic weapons you acquire on your quest.

Though you can negotiate with the competition by trading spells and forging alliances, your ultimate goal is to banish all other wizards from the universe. This isn't easy, because there are really two universes: a pastoral land called Arcanus and an alternate, more magically powerful reality called Myrror. Both must be conquered to win the game.

With fresh worlds to overrun with each new game, you'll be conquering Master of Magic again and again.

—Barry Brenesal

Ocean Life, Volume 4: The Barrier Reef

Screen savers place animated fish tanks in your computer but can't drop you into Micronesia. For that, you need

CD-ROM PICK HIT

Sumaria's Ocean Life series—informative undersea tours of South Pacific marine regions. The fourth release visits the Barrier Reefs, off the eastern coast of Australia. You can browse through a colorful visual index of 240 species and select and view crisp video footage. Included are Range maps, extensive text, narration, detailed discussions, and aerial photographs of the Reef itself.

For students, scuba enthusiasts, or the curious, Ocean Life, Volume 4: The Barrier Reef is well worth the dive.

—Barry Brenesal

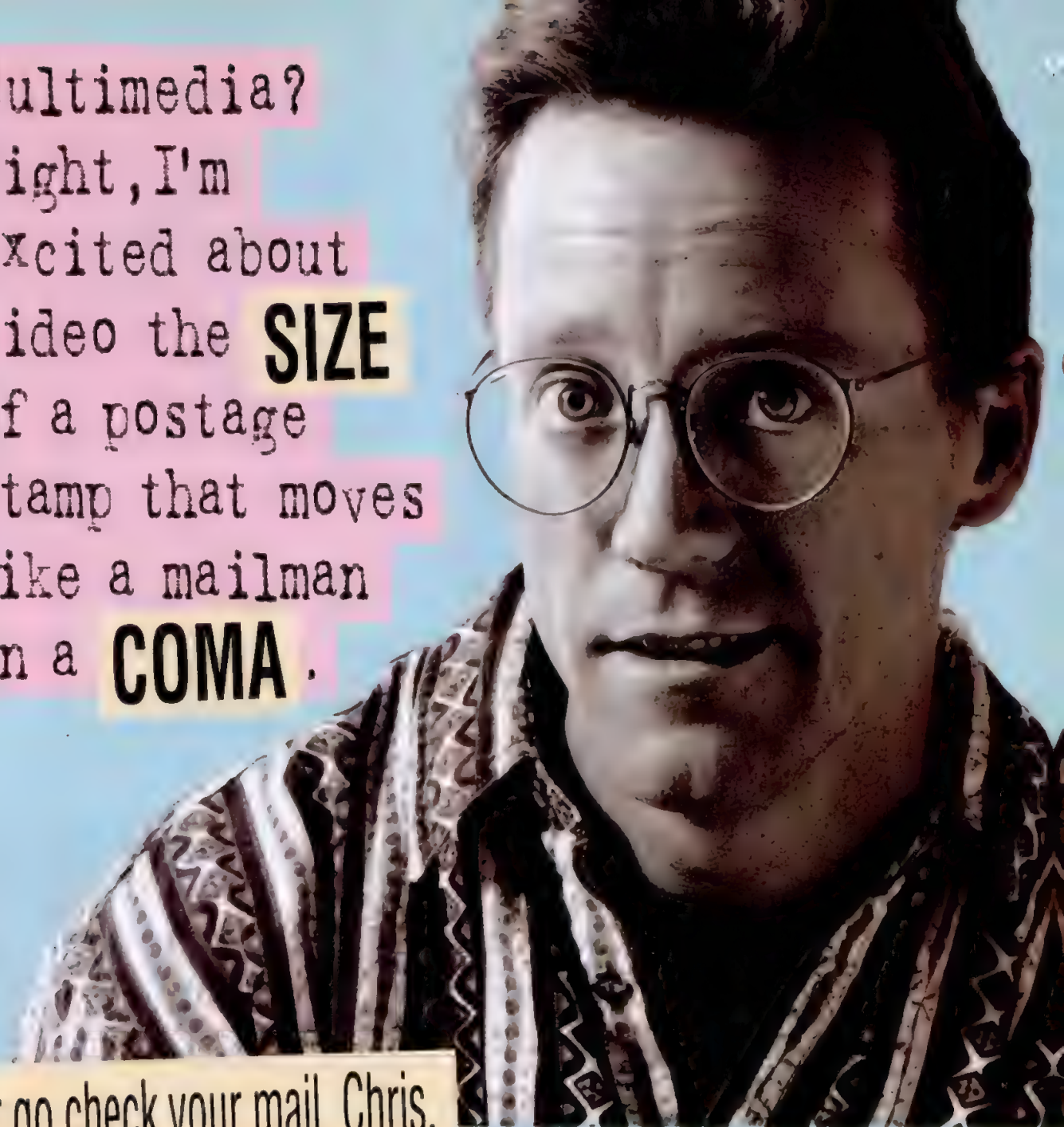
Sumaria; 415-904-0880



Circle 531 on reader service card

★★★★    \$49.95

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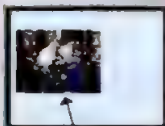
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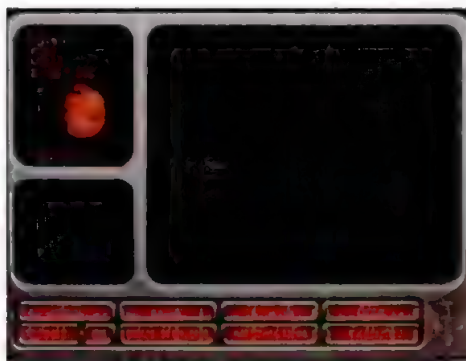
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REALmagic

After Hours



You're in charge of the entire Klorathi fleet in Origin Systems' *Wing Commander Armada*.

whopping 555K of conventional memory, so some will run into memory problems. Once we got the game running over our LAN, we were somewhat disappointed by the frequent pauses while our two PCs syn-

chronized. The delays were on an isolated Token-Ring network with only two active clients, so it's likely to get worse on larger, busier LANs.

The most notable addition here is network play, and that's so cumbersome you may want to wait for the next, more dramatically different title in the *Wing Commander* series.

—Michael Ryan

vastly improved 3-D texture-mapped graphics and a strategy mode that puts you in charge of not just one or two fighters, but the entire fleet. The game lets you fly with or against a human opponent via modem or LAN or on a single PC.

To face off over a network, *Armada* requires both the NetBIOS protocol and a

QUICK CLIPS

Recommended
It's Your Call
Not Recommended

Cartoon Gremlins

Some charming little interactive cartoons and games that can serve as reminders or just amusements. You don't need them, but they take up no more space than 18 spreadsheet revisions. \$39.00; M.P. Technologies; 301-907-0042.

Gregory J.P. Godek's Romantic Adventures

If you need to turn to your PC for advice on adding romance to your life, you're in trouble. If you can't come up with anything better than these generic suggestions on your own, then even Oprah can't save you. \$49.00; Life Change Productions USA; 800-490-0055.

Lode Runner: The Legend Returns

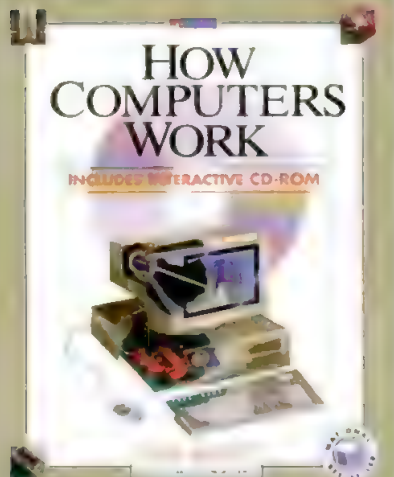
This version visually jazzes up the 1980s arcade favorite, but does nothing to enhance game play—beyond giving your stick figure a gruesome death sequence. \$45.95; Sierra On-line; 800-757-7707.

Wheel of Fortune

Spin the wheel, buy a vowel, or solve the puzzle. The world's favorite TV game show makes a fine debut on a CD-ROM that includes a digitized Vanna and more than 5,000 puzzles, but no Pat Sajak. \$49.95; Sony Imagesoft; 310-449-2334.

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Adventure

An Interactive Movie with An Emotional Bent

Vortex: Quantum Gate II

Hyperbole Studios,
206-441-8334.

Circle 529 on reader service card

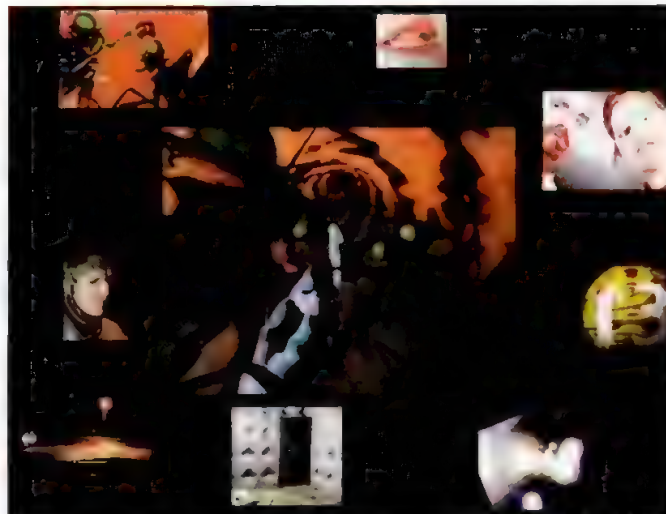
★★★★ [PC icon] [Mac icon] [Linux icon] [DOS icon] \$49.95

The year is 2057, and the global ecosystem is on the verge of collapse. You are Drew Griffin, a medical student turned military man, whose job it is to travel through an experimental gate to another world, where you'll mine an ore that will save Earth. Vicious, human-size insects await on the other side—or so you think. When your ecoarmor is breached during an attack on an insect colony, you discover you've been tricked: The insects are actually humans protecting Alyndai,

their forest-bound arcadia, from genocide. This is the conflict at the heart of Vortex: Quantum Gate II.

This isn't a game in the truest sense; there are no object puzzles or monsters to destroy. In this interactive movie you choose the emotional response that guides Drew Griffin's actions. The combination of emotion and action determines the course of the film, leading to one of five potential outcomes.

In any event, both Earth and Alyndai end up defeated—not by a third force but by the limitations of the modern PC. Even the processing speed of a Pentium can't prevent pauses during file loads. The program breaks up the screen into several small sub-



Hyperbole Studios' Vortex: Quantum Gate II offers an interesting plot and attractive graphics in an interactive movie format. Your choices of emotional responses guide the hero to one of five different endings.

ject boxes at any time, allowing Vortex to cleverly avoid glacial screen redraws, but the lack of an occasional "big picture" is noticeable.

Vortex fills three CD-ROMs, but its branching plot line is very limited and much of the atmosphere is restricted to still photos and a sound-

track that's excellent nonetheless. With a compelling story, fine acting, and excellent photorealistic graphics, Vortex: Quantum Gate II is intriguing and a fascinating harbinger of PC-based things to come. But it isn't the be-all and end-all of interactive movies.

—Barry Brenesal

The Madness of Roland, a Baroque Tale

You may not expect cutting-edge multimedia techniques from a 16th-century Italian poem that's the length of a novel. But that's just what you get in The Madness of Roland, a CD-ROM version of Renaissance poet Ludovico Ariosto's *Orlando Furioso*.

Orlando Furioso is a baroque masterpiece that mixes more than a dozen characters in a tale of knighthood, pastoral romance, satire, folklore, magic, and religion. The Madness of Roland understandably narrows the cast, but mirrors the ever-shifting action through multicharacter narration. Each of the chapters in this work can be heard and read from five different perspectives. There's the hero, knightly Roland; bloodthirsty Durandel, his magical sword; enchantress Angelica; Roland's commander, Charlemagne; and a third-person narrator to supply other viewpoints.

Prose takes the place of poetry and gone, too, are most internal references to places, people, and concepts that mean lit-

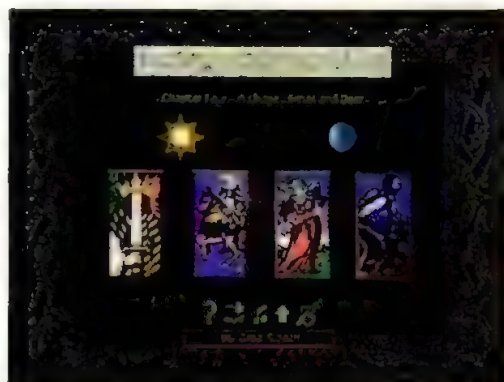
tle today. Something of *Orlando Furioso* vanishes with them, because they breathed life into the poem.

But if The Madness of Roland isn't *Orlando Furioso*, it doesn't mean that imagination is lacking. Photographs, brief videos, hypertext, multicolored text, artwork, and music intermix freely. These media somehow expand this ironic tale of official duty and obsessive love.

Still, there are flaws: A couple of voice-over secondary actors are amateur-night-only, the program frame takes up only two-thirds of the screen, and the black background behind the glowing text leads to glowing eyes over time.

Even so, The Madness of Roland is an exciting release that creates a collage of text, hypertext, sound, and video. The results are entertaining and disturbing, as good art should be.

—Barry Brenesal



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By Don Willmott

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A: Intel added 486 and 100 on the first Pentium and got 585.999983605.

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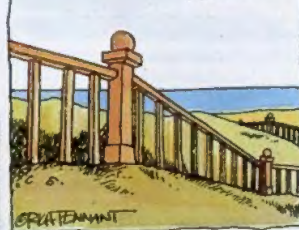
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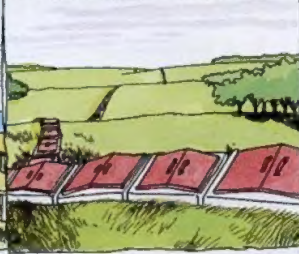
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